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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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VOL. CXL., No. 2847.] TUESDAY, DECEMBER 4, 1917. [69TH YEAR.

EDITORIAL NOTES.

"Financial Hardships" and Private Bills.

DURING the past week, there has been a conference of representatives of gas companies who have given notice of Private Bills for relief from the financial hardships created by the war. It is at the moment believed that some at any rate of the companies who initiated independent action will submit to Parliament a scheme of relief different from that which has been adopted by the National Gas Council; but should the present position of the matter eventuate in a consolidated advance in Parliament, so much the better for all parties. The particular virtue in the plan of the National Council is that it is the only one out of the number considered that appeared to the majority to have any chance of gaining acceptance as a temporary expedient for meeting the situation. There are arguments *pro et con* in respect of every scheme (the adopted one among them) that has been submitted. But it does occur to many besides ourselves that, if any company had an alternative scheme that was regarded as preferable to the one put forward by the National Gas Council—seeing that all gas undertakings are directly or indirectly connected with the Council—it would have been more in consonance with co-operative endeavour to have laid the suggested "better way" before the Council, so that other gas undertakings might have participated in it, if it really proved more acceptable. Of course, it may be that, at the time of the giving of the notices for independent Bills, the companies concerned had not an alternative scheme cut-and-dried, and that they were animated only by a desire to save time by going direct to Parliament. As to this we have no certain information.

It is, however, felt by many responsible gas men that the independent movement of some important companies might have been taken by the Board of Trade, in view of the existence of the National Gas Council, as an indication of the opinion of those companies that they could well do without the Board as an intermediary in this regard between the gas industry and Parliament. But the Board understand the position as well as we do. They know that independent action on the part of three or four companies does not in this particular connection displace the National Gas Council's representation of the rest of the gas undertakings of the country. There is, too, not the slightest question that the Board will be closely identified with what takes place in Parliament, and that the Committee or Committees to whom the question will be referred will probably be very much guided by the counsel of the Board. We cannot help thinking—as the National Gas Council also obviously think—that this is essentially a matter in which the Board of Trade, with their power of action and influence, should be the channel of operation; and it is just likely that the part of the Board in the ultimate decision, in the altered circumstances, will not be by any means insignificant. However, there is one thing that may be emphasized, and it is that, although there may be only two or three dissentients to unanimous support to the National Gas Council proposals (some further notices of Bills appear in our "Parliamentary Intelligence" to-day), the whole of the applicants to Parliament will, without exception, be united in their appeal upon the ground of common justice. Their case will be the same; and only in respect of the method of realizing relief is there likely to be any real distinction.

Although the proposed (quite temporary) modification of the sliding-scale is a proposal based on justice to those who have provided capital for the gas industry, and for protecting the future capital-raising status of gas undertakings, it must not be expected that it will get through Parliament without opposition. There are always those who regard as suspect whatever gas companies propose; and this is one of the penalties of statutory control as opposed to trading liberty as it exists in most other businesses. The prelude to possible opposition has already been seen at a meeting of the London County Council, when one member asked the Chairman of the Parliamentary Committee of that body as to their intentions respecting the notices that have been given. The reply, on behalf of the Committee, indicates the possibility of a petition being presented against those Bills that refer to the statutory area of the Council. But, of course, if the Council are persuaded of the equity of the proposals under the exceptional circumstances, the lodging of a petition may not prove to be anything more than *pro formâ*. The member who put the inquiry described the action of the companies as being "grossly unfair and "a violation of an old agreement, which in itself gave to "the companies large financial advantages, but which are "largely concealed from the public by an excessive watering "of capital; so that dividends of 5 p.ct. represent actually "dividends of 12½ p.ct. on the unwatered ordinary capital." This statement portrays a narrow view, and a want of knowledge. Agreements, as a rule, have definite foundations; but, under the conditions brought about by the war, there is not a vestige left of the original basis on which the terms of the sliding-scale were agreed. Surely no man—be he member of the London County Council or any other body, who has intelligent acquaintance with business affairs—would submit that, under such untoward circumstances as those prevailing and due to the war, capital invested in such a business as gas supply has no right to a fair return upon it. Without a just return upon the capital employed, the consumers of gas are not paying a reasonable price for the commodity supplied to them.

As to the so-called excessive watering of capital, there is (compared with the whole) very little of the original stock which is returning on actual investments dividends of the magnitude represented in the question put at the meeting of the County Council. As most of readers are fully aware (but certain members of the London County Council apparently are not), the investors in much of the gas stock paid for it more than double the par price, and for that which has been newly issued for many years past a premium has been paid which has gone into the undertakings concerned, and is free of any dividend obligation. So that the excessive watering, and the representation as to large dividends, are distortions of facts. What violation there has been of the old agreement has arisen from changed circumstances and especially war conditions—changes due to the higher value of money brought about by the financing of the war, to the greater costs of raw materials, plant, and other manufactured goods, to the costs of transport, and to much more expensive labour. The conditions of the old agreement have undergone very extraordinary alteration, which as things are, under the sliding-scale, makes in many cases the earning of a dividend that is but the shadow of what a dividend for a commercial enterprise should be, a very anxious task. Take the recent addition by the Government of 2s. 6d. per ton to the price of coal. This was given in respect of the 1s. 6d. and 9d. per day increase in wages respectively to the miners and youths under 16 years of age, and was the price of averting trouble in the coalfields. The 2s. 6d. is intended to cover, and it really more than covers, the increase in the miners' wages. But the Government who empowered the colliery owners to put the 2s. 6d. charge on to their customers were also parties to the sliding-scale. Yet here they

allow an addition to the charge for coal which alone represents a higher cost of 2⅛d. to 3d. per 1000 c.ft. without any consideration for gas stock holders under the sliding-scale. The charge is one arising directly out of the war, and so are all the other extra charges that have had to be borne the past three-and-a-half years, and which have completely destroyed the groundwork on which the terms of the sliding-scale were arranged. Even this last half-a-crown a ton on coal means 2¼ millions sterling increased cost to the gas industry. How on earth anyone expects an industry tied to a sliding-scale of dividend and price constructed for use in normal periods to make a reasonable dividend in these times with costs having taken such abnormal flights, passes the wit of all, save perhaps those men who are always looking suspiciously at what all other men are doing, or are proposing to do.

The Gas Engineer's Opportunity.

ALL around us, though living under the pressure of war conditions, signs are seen of a new industrial life, and of an intention not to allow things to relapse to their former state. There has been an awakening, and with the awakening introspection; and introspection has disclosed shortcomings which the country appears to be pretty unanimously resolved shall not occur again. We hope for the sincerity of the resolution, because it means not only national security and prosperity, but, with developing activity throughout our huge industrial system, the successes of any one of its constituent sections will act and react on the fortunes of all the others. The gas industry, we think it may safely be said, intends to do its part in the great reconstruction, revival, or whatever other description is applied to what is coming, by shaping its manufacturing procedure to fit requirements. Movements in this respect encourage new ideas for, and the hope of greater liberty in, the future. Perhaps it is an unpalatable truth, but it is undeniable that there has been very little initiative shown in the past in connection with the internal development of the gas-supply industry. What there has been is largely due to the stimulus that has flown into it from outside. The technical men of the industry cannot be altogether blamed for this. They have had to adapt themselves largely to circumstances not of their own creation. Initiative by them is not much good if it cannot be developed within the framework of statutory enactments and restrictions (some far out of date) within which they have had to operate, and outside which they dared not even poke their noses lest a penalty should follow. The result is that the development of the business of gas supply has much for which to thank external causes and initiative.

Let us look into this matter. What has been done in respect of gas-manufacturing economy? Initiative has produced only during the past few years an increase from the old 10,000 c.ft. to 12,000 or 13,000 c.ft. of gas per ton of coal, which was not a difficult matter when it was shown that, by the mere change to heavier charges and longer duration carbonization, the increase could be obtained without any degradation in respect of statutory quality. On the other hand, nothing much of a deliberate nature has been done to improve the character of coke, even in respect of its moisture content. Whatever improvement has taken place in respect of tar is an accompanying result of the heavier charges of coal, supplemented latterly by gas washing. We were still finding among returns before the war—exclusion is made of the period of extraordinary profiteering on the part of coalowners by the sale of inert material as coal with what is, through non-interference, tantamount to the connivance of the powers that be—makes of sulphate of ammonia as low as 19 and 20 lbs. per ton of coal of like character to that from which elsewhere nearer 30 lbs. were being obtained. A large part of the internal economies that have been achieved has been due to improvement in plant and working methods, the choice and application of which have been matters for the engineer. The other part has been very considerably due to the expansion of output owing to the improvement and extension of the range of gas-consuming appliances, the character of which has been to a material degree the means of opening the door to the larger opportunities that are seen around and ahead. Therefore, for enabling the industry to take advantage of these opportunities, a good measure of recognition must be accorded to those who are not gas engineers, but who have given the industry the incandescent burner, the modern gas fire and cooker, the prepayment meter, water-heating appliances, the modern gas-engine, and industrial furnaces and other apparatus. The expansion of the volume of business, through the initiative displayed in the development of these things in point of utility and efficiency, has much to do with promoting the economy which, as a rule, comes in the train of larger output, and which, with improved manufacturing plant and material handling appliances, has done so much to lower the cost of gas to consumers. The part that the gas engineer has had has been to design, adapt, manage, and make the best of his circumstances in producing low capital costs, lower working expenses, and a profitable issue from a medley of advantageous and disadvantageous conditions. We repeat emphatically that his restrictions in showing greater initiative are attributable to legislative influences. But at the same time, it has to be confessed that some blame is due to a masterly inactivity in planning and working persistently to get these influences modified.

However, we are all out for reorganization, reconstruction, expansion—the gas engineer among the rest. The developments during war time, and the production and trading intentions of the nation in the *post*-war period, have enlarged the gas engineer's outlook, and increased his focal points. He is coming into his own, if combined effort is made in attacking the legislative bounds to his activities, and continuing the attacks until conviction as to the correctness of his plans is planted in the right places. The war has shown him what is required in the way of gas quality—not solely in calorific value but in composition, with as little as possible of the flame-impairing constituents; it has shown him what can be done in increasing the yield of gas and other commodities per ton of coal handled; it has shown him how his services to industry can be enlarged through gas, coke, and other products; it has shown him how through benzol, fuel oils, coke, and gas, road vehicles and stationary engines can be supplied by him with whatever character of "fuel" they may require; it has shown him that for the future the gas industry's economic development demands that as far as possible the secondary products of gas manufacture should be dealt with by it, or, where this cannot be done, that the basis of sale to outsiders shall be on lines that will give to the producer an adequate return. In the "Parliamentary Notices" published in our issue last week, the gas engineer is to be seen feeling his feet, showing new initiative, and trying to get away from the traditional bonds and the control of precedent so dearly beloved by our Legislators, some of whom palpably fail to see that industrial progress lies in fresh invention and in adapting operations and production to the requirements of the times, and the advances of the methods of use and application. If those who are called upon to adjudicate upon the new proposals that are being put forward had lived in the gas industry during war time, and had seen the manifold character of the work that directs to the correct roads by which to advance, there would be no need for much discussion of any of the proposals which are all subscribers to economy or larger service. There is the non-illuminating gas supply scheme; the utilization by the industry of the gas produced by other coal-carbonizing industries; the establishment of much closer relations between the gas and electricity industries by the former becoming fuel suppliers to the latter, or entering into business engagements of a mutually beneficial order; and there are proposals in regard to secondary products developments as between gas undertakings, in furtherance of the industry's economic strength. In several places in these Bills, we have the index finger pointing to new opportunities, and the methods of taking advantage of them. The time for larger initiative on the part of the gas engineer has come; and those who lead will show their initiative by their schemes now, and will not come lazily waddling in with them years hence. If one wants the action to have good effect, the time to strike iron is while it is hot.

Local Authorities Organize for Opposition.

CERTAIN local authorities not the possessors of gas undertakings, but mostly of electricity concerns, have organized themselves with the amiable intention of placing uneconomic restrictions upon the gas industry, and defeating its plea for justice under the financial hardships of war times. Meantime, those huge corporations possessing both gas-works and electricity stations are uniting themselves heart and soul with the gas companies in a common endeavour to make technical progress in the interests of their communities; and at the same time, recognizing the inequitable

conditions under which gas companies are in these days working, these corporations have extended their support to the efforts that are being made to secure a fair return for gas capital, under the weight of war costs—costs of a magnitude never contemplated at the time the sliding-scale and its terms were instituted. At a conference (as reported elsewhere) of the representatives of some seventeen local authorities not owning gas-works, it was decided to form an Association to advance and safeguard the interests of those they represent in all matters appertaining to gas supplies, and upon the changes now taking place in connection therewith. From the fact that it is thought that a special organization of the kind is necessary, one would think that these local authorities have surrounded themselves by an atmosphere of suspicion in relation to gas supply by companies, and regard their administrators as a set of rogues. The electric supply industry would not consider it as a compliment if a combination of gas companies was formed for the express purpose of offering opposition to its schemes.

However, it is understood that a report prepared by the Town Clerk of Swansea (Mr. H. Lang-Coath), together with the recommendations it contained, was adopted by the conference. Touching the question of the sliding-scale, the report speaks of a proposal to raise the standard price of gas. The majority of the Bills now before Parliament are not asking for anything of the kind, but for what is tantamount to a dividend allowance upon gas capital in respect of war costs, and this for the duration of the war and a prescribed period after. The local authorities present at the conference desire to be heard upon this matter. Very well. Let them be prepared to show Parliament that investors in gas undertakings working under the sliding-scale have no right in these times to a fair return upon the capital employed to supply consumers. There is further reference to this subject in a preceding article on "Financial "Hardships and Private Bills."

As to the inquiry which is being made by the Board of Fuel Research, it is suggested by the local authorities that a calorific standard of not less than 500 B.Th.U. per cubic foot should be allowed. It would be interesting to know the reasons for this, if, by modification of processes of carbonization, economy for both gas manufacturers and consumers can be shown. There are some highly scientific questions surrounding this matter, upon which no doubt the local authorities who have fixed upon 500 B.Th.U. as a standard will have an opportunity of displaying their knowledge. Another point is that, though the Board of Trade resolved upon a minimum pressure of 15-10ths, Mr. Lang-Coath now suggests that the minimum should be raised to 20-10ths. The local authorities also desire to be heard (and we sincerely hope they will be) upon their recommendation that gas should not contain inert constituents to a greater extent than 10 p.ct., and that penalties should be fixed for any excess above this amount. Avoidable inert constituents in gas have had no greater antagonist than the "JOURNAL;" but we shall be highly interested to learn how these local authority representatives suggest that, with all varieties of coals and with all conditions of working, inert constituents can in all cases and at all times be kept down to as low as 10 p.ct., without interfering with the economic conditions of gas manufacture, and thus causing an unnecessary increase in the price of gas to consumers. However, the members of the Board of Fuel Research (who are scientific men) will no doubt be pleased to hear what practical means are proposed by the local authorities to enable the 10 p.ct. prescription to be regularly complied with in the circumstances. Of course, they have a plan, or they would not be so foolish as to suggest this limitation.

The Scottish Gas Council.

MEMBERS of the North British Gas Managers' Association met last Wednesday, under the chairmanship of Mr. Robert Muir, of Galston, and approved of the proposed constitution and rules for the Scottish Gas Council. Some minor changes were made, but nothing that affects any of the radical principles which it is intended shall govern the establishment, life, and work of the new body. From incidental remarks made during the discussion, it appears that the meeting was a somewhat small one, and that the Waverley Gas Association were not officially represented; while the conveners of gas committees and chairmen of gas companies were conspicuous by their absence. This is a pity. It strikes one that, if the Council is going to be representative of Scottish gas interests, and not solely of gas engineers and managers, steps should have been taken to have these interests present, in order that they might have had an opportunity of discussing the constitution and rules of a body in which it is proposed they shall take part, and to which it is expected they should give support. It is right that in the composition of such a Council administration and finance should have their share, because after all administration and finance represent ownership of the interests which the Council is intended to serve, and their presence will give authority which the Council could not otherwise possess. Throughout the history of organized work in the gas industry, until the British Commercial Gas Association came into being, absence of these interests was a source of weakness which was constantly being felt; and the Association, by the simple process of incorporating them, quickly gave practical proof of the truth of this. Thus it is that, before proceeding to the present stage in the formation of a Scottish Council, it would have been better to have obtained a more definite mandate from all concerned than appears to have been done up to the present. However, if the Council now secures the sympathy, interest, support, and authority of those who finance, and have final voice in the administration of, the gas undertakings of Scotland, there is plenty of good work for it to do; and there can be no question that (acknowledging the premiership of the National Council other than in matters that are peculiar to Scotland) it will then be an added source of strength to the National Council and the British Commercial Gas Association. This must not be taken as an endorsement of the appropriateness of the title chosen. In this connection, we should like to correct Mr. J. W. Napier on one point. He stated that "the only opposition that had appeared on the surface was in the 'GAS "'JOURNAL,' but that was just the measure of the anxiety "of the Press as to the importance which the Scottish Gas "Council was going to have in the affairs of the industry." This is not quite accurate. Weighing certain speeches that had been made on the subject, what we foresaw was—had there not been (as has been the case since) a deliberate definition of scope and attitude—an entanglement and division that would not have been to the benefit of the industry as a whole, including the Scottish section. There was no question of any anxiety on our part as to the "importance which "the Scottish Council were going to have in the affairs of "the industry." Our anxiety was that nothing should be done which would injure the affairs of the industry by even the semblance of a cleavage.

Gas for Road Transport.

The recent decision of the Government to appoint a Gas Traction Committee has materialized; and a very strong Committee Mr. Walter Long has brought together. The full list of the members is given in another column; and from it it will be seen that the gas industry is directly represented by Mr. W. Doig Gibb, Mr. Charles Carpenter, D.Sc., Mr. F. W. Goodenough, and Alderman W. Kay; while Mr. E. S. Shrapnell Smith, Economy Officer to the Petroleum Executive, has consented to act as Secretary for the time being. The terms of reference are to consider and report upon: (1) The employment of gas in substitution for petrol and petroleum products as a source of power, especially in motor vehicles, and the manner in which such gas may be supplied, stored, carried, and used, with due regard to the safety of the public; and (2) the action (if any) which should be taken by His Majesty's Government to encourage and safeguard the use of gas for this purpose. The announcement as to the appointment of the Committee came hard upon the heels of one that was published in "The Times" to the effect that the Government Departments concerned are considering the situation which has arisen from the substitution of gas for petrol in vehicles for which the Petrol Committee have refused petrol licences, and a large number of which are now being fitted for use with gas. If these vehicles are only required for "joy-rides," then their conversion should be stopped, and the men engaged be turned on to work of an essential character. But in view of the shortage of transport for commercial purposes and the distribution of foodstuffs, care should be taken not to do anything that would hinder improvement in this regard—assuming supplies of gas are available. The refusal of petrol licences was not altogether on the ground of whether or not a car was being, or could

be, serviceably used; the fact that there was not petrol enough to go round also had weight, and caused greater restriction in the licensing than would otherwise have been the case. Thus we feel that, if the existing strain on transport can be relieved by bringing more cars into commission through the instrumentality of gas, it should be done. It seems to us that part of the utility of the Gas Traction Committee will be removed, if there is to be any arbitrary fixing of a line of demarcation between what is and what is not a serviceable use of cars.

Meter Repairs and Renewals.

Some doubts have existed as to what the Ministry of Munitions precisely intended by their recent decisions concerning the rationing of materials for meter repairs [*ante*, p. 257]; and the National Gas Council, as our "Correspondence" columns show, have obtained from Dr. Hazell a plain interpretation. Special consideration will be given where war interest is involved; and so there will be where indirect war interest is concerned, but not quite of such friendly character. It is useful to know that orders for meters needed for replacing those beyond repair can be sent direct to the makers, who will, so far as stocks and labour permit, manufacture them from their rationed materials. The gas engineer is placed upon his honour not to violate this provision by trying to obtain meters for new customers under the pretext that they are required for replacements. Of course it follows that in these times meters and other apparatus should not be discarded unless absolutely beyond repair. What it all amounts to is that meter repairs and renewals are permissible for maintaining the supply to present consumers if materials and labour will allow; but (other than for war work) new custom requiring a new meter cannot be permitted, unless the undertakings have spare meters already in possession. We hope the same conditions are being imposed upon electricity concerns. However that may be, most gas undertakings will probably discover that meters in empty houses can with advantage be brought into active service.

Industrial Reconstruction Council.

The Committee who were appointed at a meeting held about a month ago lost no time in getting to work, and have decided upon the constitution and rules to be recommended for adoption for the Industrial Reconstruction Council which it is proposed to form, with the object (among others) of popularizing the principle of industrial self-government, and in particular to spread a knowledge of the recommendations of the Whitley report. If the constitution as drafted is accepted at a further meeting to be held shortly, it is intended to start at once upon a series of meetings to promote this object. The Council will, of course, have a wide sphere of action, as they intend to take advantage of the present unique opportunity to foster a better spirit between employers and employed; to organize meetings between employers and employed to discuss the development of industries in the national interest; to promulgate the general principles of industrial reconstruction; and to promote the formation of local organizations to further generally the task of industrial reconstruction. The Council will consist of those who approve of these objects, and who subscribe to the funds.

To Enlarge the Home Production of Fertilizers.

The Nitrogen Products Committee of the Munitions Inventions Department have proved themselves an active and painstaking body. They have been carrying out their research in a manner that gives great promise of permanent benefit to, apart from the necessities of war, the agricultural and commercial interests of the country. The survey has been wide; some of the results of a very practical character. The ammonia oxidation process (as will be seen by an article elsewhere on the work of the Committee) for producing nitric acid from gas-works and other forms of ammonia has been taken in hand with the view to placing it on a commercial basis, and so we may see a reduced need for imported nitrate. The Germans will be curious over the British improvement of the Haber process that has resulted from a study of its conditions, and that has increased the output of ammonia per unit of plant to a figure which, it is believed, has not been approached in the Fatherland. The investigation of cyanamide or nitrolim for fertilizing purposes has also been proceeding. On the whole, there seems to be the likelihood of a large accession to our home fertilizer resources after the war; and it will rest largely on three factors whether the fertilizer position will not be overdone. The first is whether the Government will continue to prosecute their present endeavours to make the country more self-sustaining in the matter of food production; the second is whether agriculturists will remain in the way of scientific culture, or show some backsliding when the war incentive to intensive cultivation is no longer existent; and the third is whether or not steps are taken to prevent fertilizers from abroad being dumped into this country to our own disadvantage and to the advantage of other countries. Without attention to these three factors, the fertilizer position may become one that will not be contemplated with pleasure by present producers.

Natural Oil Prospects of the British Isles.

There is at least one authority who apparently has not much hope as to the likelihood of the Brisish Isles producing any large contribution of natural oils, albeit the Government have determined on spending a goodly sum prospecting. This authority is Mr. D. H. Dalton, F.G.S., F.C.S. He was recently reading a paper to the Institution of Petroleum Technologists; and, in his prelude, he shows himself in opposition to the widespread conception of a store of petroleum of commercial value lying intact within the limits of the British Isles. We could not hope to vie with his method of doing this; and so we will let him speak for himself. This he does in this wise: "The natural tendency to accord belief to views of pleasing prospect accounts in a very large measure for the ready acceptance of this wholly untenable idea, and for the consequent outbreak of 'oil fever,' although occurring in much milder form than has been the case in some previous epidemics of kindred nature in this country. Possibly the present stressful condition of existence has acted as a counter-irritant, abating the normal virulence of speculative meningitis. Should the diagnosis prove to be incorrect, and the symptoms really those of healthy development, no one will be more gratified than the physician, to find his sinister prognostications mistaken. But pending such enlightenment, treatment for the disease indicated must be conducted on lines innocuous in either result, and the best system for adoption appears to be the injection of the antitoxin of facts, conveyed in a menstruum of sound reasoning." After this, there ought to be nothing more to be said; and the Government should lose all hope for great things from their enterprise under the Bill now before Parliament—especially when they consider that by the facts given by Mr. Dalton, it is demonstrated that in the British Isles (as in other parts of the world) oil-forming conditions have frequently recurred, but to a very limited extent; and although conditions favouring its accumulation, and tectonic structures capable of conserving it from escape, are also of frequent occurrence, the conjunction of the latter essentials with original formation has generally failed.

Gas Engineers and the Council of the Civils.

Memory appears to have betrayed us. In the article on "The First Gas-Engineer President of the Civils" that appeared in our issue of Nov. 13, it was stated that the late Sir Corbet Woodall, D.Sc., had been a Member of the Council of the Institution. We are informed that this was not the case. For historical accuracy, correction is made; although we think that a mistake was committed by the members of the Institution in past years in rendering such a correction necessary.

Midland Junior Gas Association.—A visit has been arranged for next Saturday afternoon to the Austin Motor Company's works at Northfield, where there will be much to see of a highly interesting nature. Special admission tickets will be issued to all members who are desirous of joining the party. The visitors will assemble at the works entrance at 2 p.m.

Financial Facilities for Trade after the War.—A strong Committee has been appointed, with Sir Richard V. Vassar-Smith as Chairman, to consider and report whether the normal arrangements for the provision of financial facilities for trade by means of existing banking and other financial institutions will be adequate to meet the needs of British industry during the period immediately following the termination of the war; and, if not, by what emergency arrangement they should be supplemented—regard being had in particular to the special assistance which may be necessary—(*a*) to facilitate the conversion of works and factories now engaged upon war work to normal production, and (*b*) to meet the exceptional demands for raw materials arising from the depletion of stocks.

PERSONAL.

Mr. J. B. BALMFORTH, Manager of the Swadlincote Gas-Works, and formerly of Silsden, has been appointed Manager of the Bingley District Council's gas undertaking, out of 56 applicants, at a salary of £250 per annum.

The Dalton-in-Furness Urban District Council, at their monthly meeting last week, appointed Mr. R. VICKERS, the Manager of the Bentham Gas-Works, to be Manager of the Askam Gas-Works. There were seventeen applicants for the position.

Mr. FORRESTER CLAYTON, the Managing-Director of Thomas Clayton (Oldbury) Ltd., of Brentford and Birmingham, has been invited to stand for the new Brentford and Chiswick Division of Parliament. Mr. Clayton is Chairman of the Brentford Urban District Council, and also represents East Brentford on the Middlesex County Council.

We join in the hearty congratulations of the South Metropolitan Gas Company's "Co-Partnership Journal" to Second-Lieutenant ARTHUR DRUMGOLD, of the Royal West Kent Regiment—the son of Mr. C. T. Drumgold, who did good work as an Employee Director of the Company—on gaining the D.S.O. for gallantry and distinguished service in the field.

It is a pleasure to record that the Military Cross has been awarded to Lieutenant RONALD BROWN GLOVER, R.E. (son of Mr. Samuel Glover, of St. Helens), who has been warmly congratulated on his distinction by his comrades in the Signal Section to which he is attached. Lieutenant Glover was wounded in Flanders during October, and is now in hospital at Rouen; but his friends in the industry will be glad to know that he is improving, and expecting soon to be sent to England.

OBITUARY.

CHARLES HAWKSLEY.

THE regretted intimation was received at the "JOURNAL" office last Wednesday from Mr. Harry E. Jones, the President of the Institution of Civil Engineers, of the death at Bayswater on the previous day of his old friend Mr. Charles Hawksley—a Past President of that body, of which he was elected a member as long ago as 1867, when he was 28 years of age. Three years later he was elected a member of the Institution of Mechanical Engineers, on the Council of which he was at the time of his death.

With our own industry he was, of course, more particularly identified through his membership of the Institution of Gas Engineers, in whose proceedings he from time to time took an active part. The name of Hawksley has, indeed, been an honoured one in the gas profession since quite the early days; and this association, it is hoped, may continue for many years yet to come. His father, Mr. Thomas Hawksley, was one of the prominent gas engineers of his day, and was the first President of the British Association of Gas Managers. On his death, Mr. Charles Hawksley succeeded to his large connection; and he, in turn, in 1900 took into partnership his son, Mr. Kenneth P. Hawksley, by whom the work will in future be carried on. The firm are very largely associated with gas, water, and sewage undertakings; the principal gas-works with which Mr. Charles Hawksley was connected being stated to be those erected at Darlington, Derby, Gosport, Oxford, and Sunderland. As to the part played by Mr. Thomas Hawksley in connection with gas-works construction, readers will gather some idea of the magnitude of this by reference to the "JOURNAL" for Nov. 7, 1916 [p. 280], in which will be found a report of a lecture by Mr. H. E. Jones on the "Gas Engineer of the Last Century." This lecture was delivered to the Institution of Mechanical Engineers; and, as it was one of the "Thomas Hawksley Lectures," the allusion in it to that gentleman's work was not only necessary to the proper treatment of the subject of the discourse, but was specially appropriate to the occasion. It will be recalled that this lectureship was founded in 1907 by Mr. Charles Hawksley to commemorate the centenary of the birth of his father. The fund for the Hawksley lecture also provided for a gold medal annually for the best original paper published in the "Transactions" of the previous year; and this may be accompanied by a premium. While touching on the family's association with the gas industry, mention should be made of the fact that Mr. Kenneth Hawksley is a Director of the South Metropolitan Gas Company.

Born at Nottingham in 1839, Mr. Charles Hawksley completed his education at University College, London, and then entered the office of his father as pupil; so that the whole of his professional life was devoted to the interests of the firm, and for the greater part of this time he was a well-known figure in the Parliamentary Committee Rooms. His character was admirably summed-up by the late Mr. James Mansergh, in introducing him as his successor in 1901 to the Chair of the Institution of Civil Engineers, as being that of a "courteous, kind-hearted, and loyal English gentleman of the first water."

The death occurred on the 12th ult., of Mr. R. A. DENT, Principal of the firm of Messrs. Dent & Co., tar distillers, of Harrogate.

Alderman H. M. MORGAN, J.P., who had for many years been Chairman of the Lichfield Gas Company, and for nearly half-a-century a member of the City Council, died with great suddenness last Saturday week. He was in his 78th year. By profession he was a doctor, practising in Lichfield, where he was born, and spent practically the whole of his life. The funeral service in the cathedral was attended by the Mayor and members of the Corporation in civic state, and by a very large number of relatives and friends—including Mr. F. Key, the Manager of the Lichfield Gas Company.

GAS TRACTION COMMITTEE.

IT is officially announced that Mr. Walter Long has made the following appointments to the Gas Traction Committee which the Government recently decided to establish:

Sir BOVERTON REDWOOD, Director of Technical Investigations, H.M. Petroleum Executive (Chairman).
Major ASTON M'NEILL COOPER-KEY, C.B., H.M. Chief Inspector of Explosives, Home Office.
Sir EVAN D. JONES, Petrol Controller, Board of Trade.
Mr. H. H. LAW, C.B., Chief Engineering Inspector, Local Government Board.
Sir ARTHUR CHURCHMAN, Controller of Mineral Oil Production, Ministry of Munitions.
Mr. W. DOIG GIBB, Technical Adviser on Gas-Works Products, Ministry of Munitions of War.
Mr. CHARLES C. CARPENTER, D.Sc., Ministry of Reconstruction.
Mr. EDWARD S. SHRAPNELL-SMITH, Chairman of Joint Committee of Mechanical Road Transport Associations, Economy Officer H.M. Petroleum Executive.
Mr. JAMES OLLIS, Chief Officer, London County Council Public Control Department.
Lieut-Colonel R. K. BAGNALL-WILD, R.E., member of Technical Committee of the Motor Industries, President of the Institution of Automobile Engineers.
Mr. F. W. GOODENOUGH, Chairman of Executive Committee of British Commercial Gas Association, member of National Gas Council.
Alderman WILLIAM KAY, Chairman of Manchester Corporation Gas Committee, member of National Gas Council.
Mr. GEORGE W. WATSON, Inspecting Engineer to the Commercial Motor Users' Association (Incorporated).
Mr. W. WORBY BEAUMONT, Technical Adviser to the Commissioner of Police of the Metropolis.

The terms of reference are to consider and report upon:

1.—The employment of gas in substitution for petrol and petroleum products as a source of power, especially in motor vehicles, and the manner in which such gas may be supplied, stored, carried, and used, with due regard to the safety of the public.
2.—The action, if any, which should be taken by his Majesty's Government to encourage and safeguard the use of gas for this purpose.

Mr. Shrapnell-Smith has consented to act as Secretary for the time being; and until further notice all communications should be addressed to him at No. 8, Northumberland Avenue, W.C. 2.

NATIONAL GAS COUNCIL.

First Annual Report.

IN anticipation of the first annual general meeting, which is to be held next Tuesday afternoon at No. 75, Kingsway, W.C., the Council of the National Gas Council of Great Britain and Ireland have issued their report and statement of accounts.

The income for the twelve months ended Oct. 31 amounted to £400, subscribed in sums of £100 each by the four constituent bodies—the Institution of Gas Engineers, the British Commercial Gas Association, the Gas Companies' Protection Association, and the Society of British Gas Industries. The expenditure by the Executive Committee during the twelve months amounted to £524 14s., or £124 14s. more than the receipts for this period. Application has been made to the four constituent bodies for further subscriptions of £100 each in respect of the coming year; but the Council say it will be realized that this sum will be insufficient to cover the deficit and the expenditure of the Council, in view of the increasing amount of work which is likely to devolve upon the Executive Committee.

The policy of the Council has been to endeavour to consider, through the medium of the Executive and General Consultative Committees, every matter of general importance to the gas industry brought to their notice, and to take such action with the Government or other authorities as seemed best to meet the situation. The Council are glad to report that their dealings with the various Government Departments have always been of a most friendly nature.

As to the work undertaken by them during the past twelve months, the Council point out that this was fully dealt with in the reports of the Executive Committee, submitted to the Council on June 4 and Oct. 30 respectively [see "JOURNAL" for June 5, p. 427, and Nov. 6, p. 257]. They, however, give a list of the subjects dealt with, and of the interviews which have taken place with Government Departments.

The report is signed by Mr. H. E. Jones (President), Alderman F. S. Phillips (the Chairman of the General Consultative Committee), and Mr. D. Milne Watson (the Chairman of the Executive Committee).

FINANCIAL HARDSHIPS OF GAS UNDERTAKINGS.

FOLLOWING a meeting of the Financial Hardships Committee of the National Gas Council, a gathering of representatives of undertakings which are promoting Bills in the ensuing session of Parliament was held at No. 39, Victoria Street, S.W. Those who attended included:

Sir JOSEPH BELLAMY (Plymouth).
Mr. H. E. BLOOR (York).
,, C. F. BOTLEY (Hastings).
,, T. J. BRADFIELD (Commercial Gas Company).
,, JNO. H. BREARLEY (Longwood).
,, C. E. C. BROWNE (Messrs. Dyson & Co.).
,, C. CARPENTER, D.Sc. (South Metropolitan Company).
,, GEORGE CLARRY (Cardiff).
,, E. CAMPBELL COOPER.
,, F. E. COOPER (Gas Companies' Protection Association).
,, J. E. LISTER COOPER (Yeadon and Guiseley).
,, T. H. DUXBURY (South Shields).
,, F. A. GULLAND (Maidstone).
,, H. A. HOOD (Brentford).
,, CHARLES HUNT (South Suburban Gas Company).
,, H. E. IBBS (Gas Light and Coke Company).
,, J. R. H. JACOBS (Southampton).
,, C. H. WILLES JOHNSON.
,, A. A. JOHNSTON (Brentford).
Mr. H. E. JONES (Wandsworth Gas Company).
,, S. H. JONES (Commercial Gas Company).
,, J. KENNEDY.
,, WM. C. LAMB (Hampton Court).
,, T. MAY (Richmond).
,, SYDNEY MURRAY (Garw & Ogmore).
,, W. E. PRICE (Hampton Court).
,, ALFRED PROCTER (York).
,, J. PROFFITT (Hampton Court).
,, T. P. RIDLEY (Newcastle-on-Tyne).
,, W. C. BEASLEY ROBINSON (Monier Williams, Robinson, & Milroy).
,, W. SEDGWICK.
,, H. A. STIBBS (Portsea Island Gas Light Company).
,, GEO. H. TEALE (Yeadon and Guiseley).
,, E. UPTON (Liverpool).
,, T. WADDOM (Newcastle-on-Tyne).
,, D. MILNE WATSON (Gas Light and Coke Company).

A discussion took place regarding the nature of the proposals for financial relief which were being introduced into the Bills of the undertakings represented. The course of action favoured by the considerable majority of the promoters present was to follow the lines of the resolution of the National Gas Council passed at the meeting held at the Central Hall, Westminster, on Oct. 9.

Reference was made to the careful and sympathetic deliberation which the Board of Trade are giving to the matter in its effect upon the industry as a whole; and at the close of the meeting the Special Sub-Committee of the Council who have been appointed for the purpose proceeded to a further interview with the Board of Trade officials.

THE NITROGEN PROBLEM.

[Communicated by the Ministry of Munitions.]

THE war has forcibly brought home the vast service that science can render to trade and industry. In almost every branch of business the chemist and scientist can reduce costs, increase profits, and open-up new fields for the merchant to conquer. Research incidental to the conduct of the war has shown that this applies particularly to the industries dependent on nitrogen compounds. Forced by circumstances to face the problems connected with the provision of ammonia and of nitric acid by the newer synthetic processes, we are well on the way, thanks to the valuable work of the Nitrogen Products Committee of the Munitions Inventions Department, to solutions that promise permanent benefit to the agriculture and commerce of Great Britain, apart from the immediate assistance rendered towards the successful prosecution of the war.

Nitrogen compounds are, of course, essential for explosives, and in the form of fertilizers for agriculture. The world's consumption for agricultural purposes almost doubles every ten years. In 1913, it was no less than 2½ million tons of Chile nitrate, and about 1½ million tons of sulphate of ammonia. As long ago as 1898, Sir William Crookes predicted a shortage in the world's wheat supply, and urged the vital importance of finding other sources of nitrogenous fertilizers, in view of the fact that the natural deposits of Chile nitrate were limited in quantity. Sir William himself experimented in obtaining nitrogen from the air. Other countries appreciated the possibilities thus indicated, and set to work on the problem of nitrogen fixation. Norway, being at an advantage with cheap water power, adopted the arc process, which produces nitric acid direct from atmospheric nitrogen and oxygen, but only by enormous consumption of power. Germany, on the other hand, mainly concentrated on bringing to a commercial success a process worked by Prof. Haber for producing ammonia by the union of hydrogen and atmospheric nitrogen at extremely high pressures, and at an elevated temperature.

We, however, with whom the idea of nitrogen fixation originated, did nothing; the ammonia recovered at gas-works and coke-ovens being practically the only form of combined nitrogen produced in this country. When the war began, the Central Powers, by extending their established nitrogen fixation processes, and by developing others—such as the cyanamide process for the production of nitrolim or ammonia, and the oxidation process for converting ammonia into nitric acid—became self-sustaining. Though the command of the seas enabled us to import from Chile all the nitrate of soda we needed for munitions and agriculture, and so escape the consequence of our scientific neglect, the beginning of the submarine campaign in February, 1916, forced us to review the position.

In June, the Nitrogen Products Committee was set up, under the Chairmanship of the Comptroller of the Munitions Inventions Department of the Ministry (Colonel H. E. F. Goold-Adams, C.B., C.M.G., R.A.). Before the Committee lay the difficult task, not only of discovering the working details of some of the more important processes which are carefully guarded by the foreign firms who are working them, but of making the processes commercially practicable. Because of the pre-eminent position held by the Haber process in Germany, where the economic conditions as regards coal supplies and the comparative absence of water power are similar to those here, and because it was plain that the research would be especially difficult owing to our limited knowledge of the process, attention was first directed to the problem of the production of synthetic ammonia. The Committee then turned their energies to bringing to a commercial stage the ammonia oxidation process for producing nitric acid from gas-works and other forms of ammonia—a process which had not hitherto been practised in England, though worked to some extent on the Continent.

The fruitfulness of the Committee's inquiries led to the issue of an interim report in February last; and on this the Minister of Munitions (Dr. Addison) decided to take action, among other things, upon the ammonia oxidation process. The Explosives Department has since taken over the task of establishing the process on a commercial basis. Manufacturers interested in ammonia oxidation met the Comptroller and the Research Staff, with the practical outcome that in several of the largest chemical works the process is being introduced to take the place of the nitre-pots used in the making of sulphuric acid by the chamber method. Seeing that before British chemists concentrated their attention on this problem the annual consumption of Chile nitrate for the purpose in question was 18,000 tons, the saving of shipping space by the adoption of the ammonia oxidation process may become very material.

The investigation of the Haber process has involved the solution of several difficult chemical engineering problems, as was to be anticipated in operations necessitating the compression and manipulation of gases at extremely high pressures. The whole of the conditions governing the process have been thoroughly studied, with the result that a method of working has now been devised whereby the output of ammonia per unit of plant has been increased to a figure which, as far as is known, has never been approached, even in Germany—the home of the process. A semi-technical Haber unit is now in operation, and is providing data concerning the few further details to be elucidated prior to the erection of a full-sized unit. As an outcome of this synthetic ammonia research work, a process has been discovered for the preparation on a large scale of the purest hydrogen; and the promise displayed in the small-scale work is now being put to the test by semi-commercial trials.

Although the Committee have concentrated particularly on processes valuable as war measures, the possibilities of nitrogen fixation in relation to agricultural and commercial requirements after the war have not been lost sight of. The manufacture of cyanamide or nitrolim—a valuable fertilizer—has been investigated by a deputation which proceeded abroad for the purpose. It is not unlikely that the industry may be established in this country, to meet the demand for fertilizers that is anticipated as a result of the Board of Agriculture's new policy, which will bring several million additional acres into cultivation.

To establish certain nitrogen fixation processes on a sound basis, cheaper electric power will be imperative. An inquiry has been made as to the possibility of cheapening the production of electric power from coal by the use of methods permitting of the recovery of ammonia, fuel oils, and other bye-products hitherto wasted when raw coal has been directly used. Schemes for the utilization of various undeveloped water powers in this country for electric power production have also been examined. The survey of a particular drainage area has recently been completed, and has revealed a potential source of 40,000 electrical horse power in an important industrial area. Finally, the Nitrogen Products Committee have investigated the probable requirements of the country for nitrogen compounds, and have gone carefully into the probable cost of manufacture by the various synthetic and non-synthetic methods in the light of experience in allied industries.

Moreover, in order to review the nitrogen problem as it affects the Empire, the Committee have got into direct communication with official representatives of Australia, Canada, New Zealand, South Africa, Egypt, and India. They are in touch, too, with Allied countries. France, Italy, and Russia have representatives acting in *liaison* with the Inventions Department on the nitrogen problem.

The final report of the Committee (which it is hoped will not be long delayed) will form an impressive record of scientific industry and resource, bearing testimony to the truth that Great Britain, once she is roused, is equal to any emergency.

ELECTRICITY SUPPLY MEMORANDA.

THE electricity supply industry was born and cradled in uneconomy; and it has grown to its present proportions under the same conditions. But its technical men see that growth under these conditions has its bounds hard set. Its costs per unit generated have been heavy; its thermal efficiency ludicrous. But now things are improving. Under favourable conditions, costs per unit are receding; and thermal efficiency—still pigmy against the gigantic thermal losses—is ascending by reluctant steps. In his Presidential Address to the Liverpool Engineering Society, Mr. H. Dickinson showed how, owing to the steam-turbine, and mounting (say) two 10,000 KW. generators on one shaft, a 20,000 KW. set, running 3000 R.P.M., is now possible. But there are comparatively few electricity stations that are qualified for these conditions. However, to illustrate what has occurred in some cases, Mr. Dickinson takes six towns in the Liverpool district. In the year ending March, 1907, the aggregate number of units generated by these towns was 77 millions; and for the year to March last, 285 millions. The costs, including capital charges, were reduced from 1·326d. per unit in 1906-7 to 0·897d. in 1916-17, in spite of an increase of 75 to 100 p.ct. in the expense for fuel. The average price obtained for all supplies has been reduced from 1·6d. to 0·97d. per unit. This shows what has been done; and it may be expected that, with the increase of consumption fostered by lower prices due to improvements in generation, and the clearing out of wasteful plant, still further economies will be effected, to the commercial advantage of the industry. But thermal efficiency has not shown the same desire or capacity for presenting a better appearance. We turn to Mr. A. Page's address as Chairman of the Scottish Local Section of the Institution of Electrical Engineers. Dealing with the question of the efficiency of the transformation of coal to electricity, he mentions how the thermal efficiency of the generating stations in the area round and including Glasgow during last financial year was only 8·6 p.ct.! This is a figure that is high compared with some stations taken separately. It is said that the figure could be raised to 17 p.ct. on large systems—at any rate, an assurance is given of 15 p.ct. coal to electricity at the consumers' terminals, which would represent a saving of 43 p.ct. in coal, equivalent in money at present prices to £181,000 per annum. The 15 p.ct. is nothing much about which to boast, save in comparison with disgracefully lower figures; but it marks progress, which Mr. Page places to the credit of turbo-alternators. The over-all thermal efficiency of the set installed at Glasgow in 1904, assuming good boiler-house conditions and without allowing for auxiliaries, was 11·8 p.ct. In 1908, when the speed was doubled, machines were obtained giving a thermal efficiency of 13·9 p.ct. This was followed in 1912 with units twice the size of the original sets giving 15·6 p.ct. It is expected that the three 15,000 to 18,000 KW. sets on order for the West of Scotland district will be in commission for next winter's load; the guaranteed efficiency at full load being 21·3 p.ct. The steam pressure for supply to these turbines is to be 250 lbs. per square inch, superheated to 650° Fahr. Incidentally, Mr. Page mentioned that, with the present available knowledge, he does not hope for much for electricity supply from the low-temperature carbonization of coal.

Generating Economies.

Like many other electricians, Mr. Page is looking for considerable developments in respect of the demand for electricity; and naturally, if these developments materialize, and mean "grist" for the electricity stations supplying also the current for town purposes, it will make an impression, or should do so, upon the economic, and therefore the trading, conditions of these stations. He refers to the fact that only 24 p.ct of the power used in Scotland is generated electrically, which shows that there electricity has not nearly reached saturation point. As to the new possible uses, he first mentions that the consumption of coal on Scottish railways for locomotive purposes last year was 2,187,000 tons, and claims that electrification would reduce this to the extent of 40 p.ct., which, from the electrical standpoint, means an output of 1000 million units. Then there are at present only four electric steel furnaces in Scotland; but there are "many" on order. Had the 1,750,000 tons of steel produced in Scotland last year been made electrically, it would have represented a consumption of 1100 million units of electricity. He looks to the fixation of atmospheric nitrogen by special forms of the electric arc, the production of calcium carbide, and other chemical processes to boost-up demand enormously. He also anticipates electro-culture and the driving of agricultural implements as affording many spacious outlets for current; while other promising developments are electric vehicles, electric welding, and heating, cooking, and other domestic applications. It is to be observed that Mr. Page puts domestic heating, cooking, and other domestic applications last in the list of promises in his futurist outlook. Let us go back a bit. It is most probable that railway electrification will be a thing entirely apart, and would be undertaken by the railway companies themselves, as they would undoubtedly prefer to have the generation of the motive power directly under their own wing. The electric steel furnace would be a purely local development in areas where the steel industries exist; and the charge for current for this purpose will have to be considerably less than now obtains in order to realize extraordinary developments in competition with electric steel from other quarters. As to the fixation of atmospheric nitrogen and the production of nitric acid by special forms of the electric arc, there are competing processes; and it is a question of the survival of the cheapest process. Regarding electro-culture, it is a question whether the agriculturists will welcome an additional process as an auxiliary to the use of artificial fertilizers; and the plant physiologist has yet to tell us as to the actual beneficent effect (if any) upon the growths. The fat man is not always the healthiest; and the forced inflated roots and cereals may not contain any more nutriment than produce of more normal character. The intermittent use of farming implements where farms are scattered in distant rural areas may not make the best possible custom for an electric station, with current at power rates. As to the electric vehicle, with the end of the war, petrol, benzol, and other motor spirits will be looking out for some enlarged custom; and for commercial motors, compressed gas in cylinders will be, on account of cheapness, also in demand. The electric vehicle may largely be adopted by electricity departments and municipalities who can afford out of the ratepayers' pockets to pay £1200 to £1500 apiece for them for cartage purposes. As to domestic heating and cooking, doubtless the members of the electrical profession are not losing sight of what the gas industry is doing in developing the gas and liquid products of every ton of coal it handles. There are interesting proposals in Parliament this year. The gas industry is bent on putting into the possession of consumers a larger number of B.Th.U. for a given price; and this objective it is intended to attain not only by increasing the production of gas per ton of coal, but by improving the diversity of business from the raw material. With this fresh condition, electricity will have to compete.

A Hopeful Outlook.

Every week the reader of the electrical journals learns of additions to the rates charged for current, for which various reasons are assigned; the favoured one just now being the handsome retrospective addition to the price per ton of coal given by the Coal Controller to the colliery owners in respect of the advance of wages to the miners. But despite these repeated additions to the charges for current, many electrical stations under local authority management show a growing propensity for making deficits, while company undertakings have to order their charges so that a dividend is made, or they have to go without. They do not, as a rule, go without; by some means they continue to earn something. Take the week's electrical papers before us, we see recorded in them that the Kingston-on-Thames concern managed to make a deficit last year of £6790; Buxton, one of £2778; Dartford, £2113; Dublin, £1575; St. Helens, £501. Generally speaking, fuel is accused of being the chief contributor; and daylight saving, earlier shop closing, and lighting restrictions (which are a bit played out to-day) have done their part. But the same things all apply to dividend-earning companies. Perhaps something ought to be said in extenuation of the large deficit at Kingston-on-Thames. The Engineer (Mr. J. E. Edgcumbe) states that the principal reason for it is the greatly increased cost of fuel, owing to the larger proportion of coal which has been consumed as compared with fuel oil. On account of the fracture of the crank-shaft of a two-cycle Diesel engine, the plant was out of commission during the whole of the year, and the larger portion of the units supplied were generated by steam plant. The 757,980 units generated by steam last year cost in fuel £8265, equal to 2·617d. per unit, while the 492,605 units generated by the four-cycle horizontal Diesel plant cost in fuel £865, equal to 0·421d. (or less than ½d.) per unit. The cost per unit generated increased from 3·622d. in 1915-16 to 4·618d. in 1916-17, while the receipts per unit sold declined from 3·491d. in the previous year to 3·314d. in 1916-17. There are two observations to be made on this report. One is that the fuel cost is not a safe one to take for comparison as between steam and oil generation. The total costs of each system should be given. The other is that there are electricity stations of the output of Kingston-on-Thames (perhaps differently situated in respect of the coal-fields) that, working on coal alone, did not make a deficit of £6790 last year. Among other interesting items is that various undertakings are asking the consumers to economize, particularly during the period of heavy loads, and a large number, owing to the difficulty of obtaining materials and labour, are declining all additional orders for heaters, cookers, and other appliances.

Short Charges and Large Deficits.

A heavy expense for the electric light consumer is the renewal of his lamps, particularly in these times. He is unfortunate in that, when he wants to renew, he has to buy a new lamp outright. The user of incandescent gas-burners only at intervals measured by years has to renew his burners; and the inverted type of mantle suspended from its support, instead of vibrating on a prop as in the upright form of burner, has so prolonged mantle life that active service is continued so long that it now comes as a surprise when a mantle has to be replaced. The cost of a mantle is not much more in pence than an ordinary (not the gas-filled) metallic filament lamp costs in shillings. But promise comes from Manitoba so far as gas-filled electric lamps are concerned. According to the "Electrical World," Mr. A. J. West, of Winnipeg, has patented a lamp which can be readily recharged with gas and fitted with a new

Renewable Filaments for Lamps.

filament. It is said that it is only necessary to retain the gas in the globe under its own pressure. The lamp is so made that the globe can be removed to permit the renewal of the filament; and when the globe is attached to the head, the joint is tight enough to retain the gas admitted. Further, in the head is provided an easy means for re-filling the lamp with gas. Upon the filament being rendered useless, the globe can be unscrewed from the head, and the filament withdrawn through the neck of the globe. After a new filament has been substituted, the globe can be replaced, when it is necessary to re-charge the globe with gas. This is accomplished by removing a screw-plug and re-charging the globe. After the filling of the globe with gas, it is screwed tightly in, and the plug re-inserted. The vacuum type of lamp, of course, presents greater difficulty.

Water Heating Claims and Figures.

The improved "Falco" hot-water circulator has been noticed in the "Electrical Times." It is intended that the circulator shall be connected to any existing hot-water tank or cylinder to replace or to supplement the coal-fired kitchen boiler, or be fitted up as an independent means for securing hot water for washing, baths, or other domestic purposes. Hot water, it is stated, is discharged from the circulator into the storage tank at a temperature of "about" 180° Fahr.; and in ordinary work it operates at an efficiency of between 85 and 90 p.ct. The standard size is loaded at full heat to 2 KW. Per twenty-four hours, it is said the standard size has an output of water equal to "about" twelve baths. Let us examine this statement, and see what it amounts to. Assuming that the circulator is going "full blast" the whole twenty-four hours, and that twelve people are inclined to spread themselves over this period and to take their turns at having a bath, 48 units of electricity would be absorbed, which would be equal to 164,160 B.Th.U.; and 85 p.ct. efficiency into the storage tank would reduce this to 139,485 B.Th.U. Nothing is allowed for radiation and other losses during the time of heating-up and water circulation; the figures given being representative of delivery only into the storage tank. Suppose we start with water at 48° Fahr. The difference between this and 180° is 132°; so that 139,485 B.Th.U. would be equal to raising 1056 lbs. of water to the temperature named, which is, in round figures, 106 gallons. Divide this between the twelve baths, and we have less than 9 gallons per bath, and this will not be water (owing to heat losses) at 180° Fahr. Assuming the current costs 1d. per unit, the 48 units would entail an outlay of 4s. for the twelve baths of less than 9 gallons, which quantity would make but shallow showing in a decent size domestic bath. We go on to read that a 2 KW. circulator will raise about 8 gallons of water per hour from 60° to 150° Fahr.—that is to say, 80 lbs. of water have to be raised 90° per lb., which will require 7200 B.Th.U. Two kilowatts of electricity are equal to 6840 B.Th.U., and 85 p.ct. efficiency gives us 5780 B.Th.U. to do the work of 7200 B.Th.U., without calculating any heat losses after delivery into the storage tank! There is some discrepancy between the B.Th.U. required to do the work and the B.Th.U. available. The "Electrical Times" should look into the figures given them to see whether they conform with actual facts.

THE DAVIS GAS-FURNACES.

Further Development by the Davis Gas-Stove Company.

EVER since the writer's first visit to the Luton works of the Davis Gas-Stove Company, which was about the time they came completely under the direction of the present *régime*, each succeeding visit has brought fresh evidence of the progressive spirit that infuses the operations and that is promoting systematically, and by the aid of technical research, new developments in every field in which gas is employed for heating purposes. The state to which the Company would have reached to-day, through the zeal and the perseverance that dominate its affairs, had not the retarding influences of the war and one other piece of adversity interrupted, cannot be estimated; but the prevailing indications assume that it would have far exceeded the successes that have such existing material presentment. In fine, it is surprising that the Company have been able to do so much in the current adverse circumstances of metals and men.

A War-Reduced Staff and Government Work.

Though these matters are not the ones that are the main subjects of this article—but gas and oil furnaces—one cannot avoid taking the opportunity of incorporating a few notes which illustrate the difficulties with which the manufacturers of gas appliances have had to contend, though we do not know that all our gas appliance makers have had to bear proportionately quite the same weight in respect of man power shortage as the Davis Company. Wandering round the Luton works the other day, one was struck by the extent, compared with former visits, to which the ranks of skilled workmen had been depleted in every department, as well as the extent to which women labour was being employed on machine and transport work; and everywhere, a variety of war work monopolizing a considerable part of the men and women, foundry and shops, was seen a grim determination to do a good part in helping to keep our armies supplied and to make things as warm as possible for the enemy. Naturally, the ordinary work has suffered considerably. The whole place, too, is under Government control, and has been so since the beginning of 1915, with a present staff of 26 Government inspectors, of both sexes. When the war started, there were in the Luton establishment over 100 Territorials, who at once responded to the great call. Some will never return to their old places. The firm have been patriotic to the last degree. Not a single outside man is badged; and application has not been made for one to be badged. The same can be said of the sales department and the offices. And from the early part of the war, everything possible was done to encourage the men to join the Colours, by promising that their wives should have contributions from the firm, so that there should be no financial sacrifice. The result of this is that the works were seriously handicapped, so far as men were concerned, right from the outbreak of war.

A Disturbing Fire.

There came a morning when there was superimposed upon the war conditions a terrible weight, which caused a temporary breakdown—and the Company are still in some measure suffering from it—of the then already restricted power of the Company to meet the requirements of their gas patrons. But day by day since has found the Company, as fast as the difficulties of the times will allow, reconsolidating their position, and re-establishing their power of supply. What happened was sufficient to break the most hardy spirit. Fire occurred, and in a surprisingly short time had laid to waste the whole of the stores, the gas-stove fitting shops, the main warehouse, the japanning shops, and part of the polishing shops. The writer stood on the scene of part of the destruction, covering some acres of ground; and the work of reconstruction was still going on—another evidence of the shortage of labour. The fire took place during the month of September of last year; but within a few days reparation on a temporary and reduced scale was making itself felt by the installation of machinery in other parts of the works. But the loss of stores, with the prevalent conditions as to materials and labour, was the hardest blow, especially in view of the enormous difficulty of replacing brass fittings and other parts. Hence the trouble of the firm in keeping pace with orders; and, indeed, it was only by the prompt measures adopted to resume, as soon as possible, a reduced stream of output that any impression could be made upon the accumulation of orders. To-day new buildings are standing in place of some of the old ones, and reorganization in other parts has restored a very large portion of the war time capacity. A big open space, with the iron standards still erect marking the site of the destroyed stores, has still to be re-occupied. But one great encouragement to the firm has been the kindness and tolerance of their patrons throughout the days of difficulty.

The Furnace Demonstration Room.

Withal, the Company have been unremittingly prosecuting the work of their new department, which is being carried on by the Davis Furnace Company, which is (so to speak) an off-shoot of the Stove Company. It was early recognized by them that in the full development of modern heating methods as applied to present-day industrial conditions much remained to be done in the way of research and experiment. It was to investigate the work that has been done, and the results in the way of furnaces, that this last visit to Luton was especially made; and it was found that the experience and the testing have covered all branches of industrial heating, particularly in regard to the use of gaseous and liquid fuels in place of solid fuel. The equipment for the testing, and for the demonstration of the virtues of the furnaces large and small, is most complete.

Introduction was first made to the spacious furnace demonstration room, in which, though several of the furnaces were in operation at the time, running at temperatures from a few hundred degrees Centigrade up to about 1600° C., the atmosphere was quite endurable. Around the room are arranged furnaces of different types and sizes, and in the centre are large furnaces brick built and strongly braced by cast-iron uprights and cross members. To some of these we will give individual attention presently. But in this room the would-be purchaser, be he gas engineer or manufacturer, can test under any circumstances the gas or oil furnaces, and with the very metals he chooses to supply for the purpose—in fact, the firm prefer that their furnaces shall be so tested before they leave the works, in order that any necessary adjustments may be made to ensure satisfaction when they reach the place of permanent service. There is no limit, within the scope of practical requirement, to the testing that can be carried out here; and every essential particular as to consumptions and temperatures can be registered.

Part of one side of the room is tenanted by the pressure-raising plant. There are three electric-motors. One drives a fan for giving air at low pressure for use with fan air-furnaces, low-pressure oil-burners, &c. The second motor drives a Keith compressor for supplying air up to 5 lbs. pressure for use particularly with furnaces fitted with Davis's air-blast burners—such as crucible and high-speed tool furnaces. The third motor drives a small gas-booster for giving any required main pressure; otherwise, if several furnaces were going simultaneously, they might suffer from insufficient supply. A few detailed particulars will show the completeness of the gas and air pressure-raising plant. Here is seen a Keith E—rotary compressor, with a capacity of 10,000 c.ft. per hour at 4½ lbs. outlet pressure. Then a Roots type blower comes

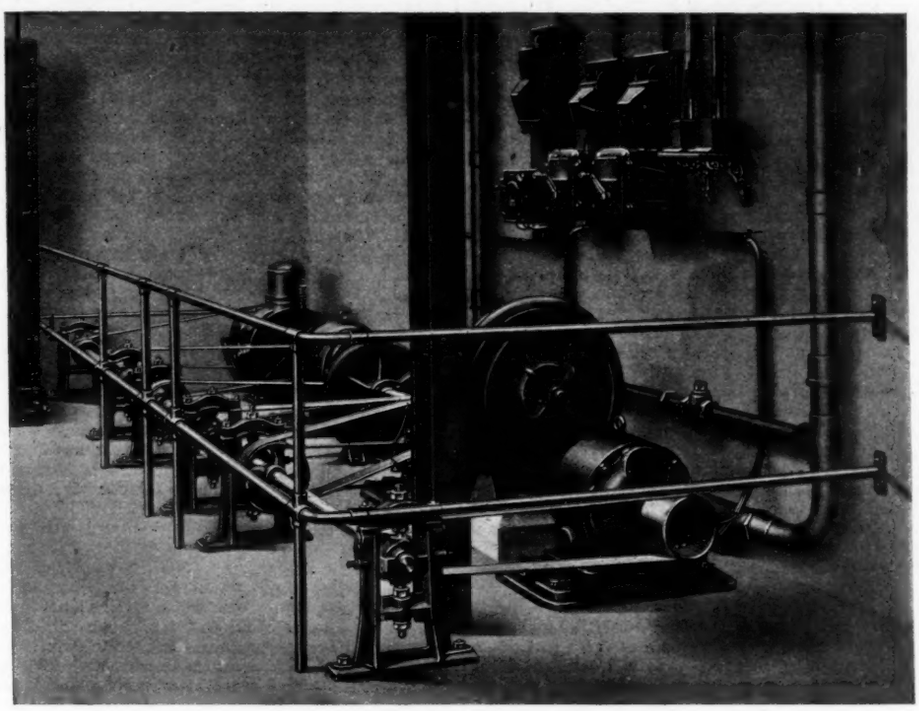


FIG. 1.—FURNACE DEMONSTRATION ROOM—COMPRESSORS, &c.

under notice, with a capacity of 15,000 c.ft. per hour at 28 in. water column. An air-fan claims attention, suitable for pressures up to 15 in. water gauge. A gas-boosting fan, suitable for pressures up to 15 in. water gauge, is also among the equipment. Available, too, are a reciprocating compressor (with a capacity of 1500 c.ft. of gas for an outlet pressure up to 20 lbs.), and an air compressor, with a capacity of 30,000 c.ft. per hour up to 45 lbs. Elsewhere in the room are observed a meter for registering gas consumption, and two small oil-tanks fitted with graduated gauge glasses, so that the oil consumption can be taken at any furnace for any period. Here also is an air-pressure reducing-valve for lowering the pressure to any suitable extent for use with the firm's twin-jet atomizer oil-burners. Adjacent is seen the laboratory where a large amount of preliminary work is carried out in connection with the furnace business, as well as analyses of flue gases, &c., and pressure and temperature records are kept. There is nothing wanting to ensure precise work and information, so that the purchaser competent to make tests need not take anything for granted that is told him, but can check everything.

DESCRIPTION OF SOME OF THE FURNACES.

The whole of the furnaces seen in the demonstration room cannot be particularly described; but we will touch upon some of the features of certain of them in order to give an idea of the range and capacity of the firm's new productions, over which neither time nor expense has been spared in order to attain a high working efficiency, and to give structural durability.

CRUCIBLE FURNACES.

The first furnace to which attention is drawn is a gas-fired crucible. It is of the pit type, and is furnished with a plumbago crucible of 60 lbs. (brass) capacity. The burner is of the air-blast type for gas at town pressure, and up to 3 lbs. per square inch air pressure. This furnace, it is mentioned, is suitable for

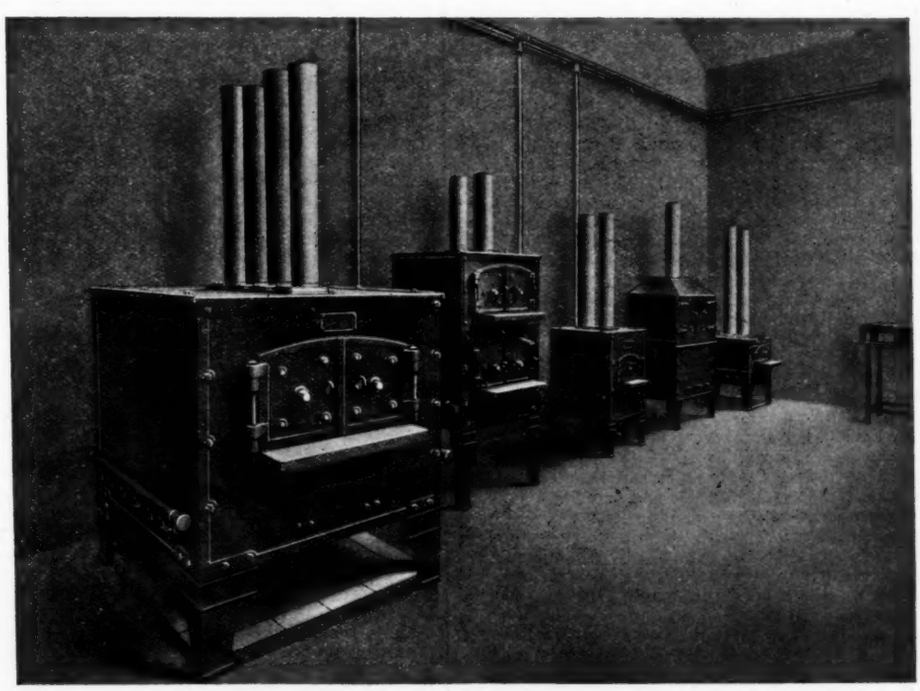


FIG. 2.—FURNACE DEMONSTRATION ROOM—OVENS AND MUFFLES.

melting metals having a fusing-point up to 1100° C. The same description applies to an adjacent larger furnace, fitted with a 150-lb. crucible, but suitable for melting metals having a fusing-point up to 1450° C. A neighbour is an oil-fired crucible furnace, also of the pit type, with plumbago crucible of 60 lbs. (brass) capacity. It is provided with fan air-oil burner for oil with a gravity feed under 1 lb. per square inch pressure for the melting of metals having a fusing-point up to 1450° C.

NATURAL DRAUGHT OVENS, MUFFLES, AND MELTING-FURNACES.

On another side of the room are specimens of natural draught ovens, muffles, and melting-furnaces, suitable for varying temperatures up to about 1150° C., without the use of any pressure-inducing plant for either gas or air. Let us take them in the order in which they were examined. First came a furnace of the Davis single-oven type, with heating chamber 24 in. × 36 in. × 12 in. This is fired by a self-intensifying burner for gas at town pressure. This was seen in operation at a working temperature of about 950° C., and the oven was very uniformly heated. But in the next furnace we have something of greater intensity; the working temperature in this case running up to 1150° C. This is one of the firm's regenerative muffles with clear working space inside the muffle of 8 in. × 14½ in. × 5 in. high. This is also fired by self-intensifying burners for gas at town pressure. The next example is a twin muffle furnace; the heating chambers being superimposed, and both of the muffle type—the upper chamber, which is for preheating, being run at about 600° C., while the working temperature in the lower chamber runs up to about 900° C. Each muffle has a clear working space of 12 in. × 14 in. × 5½ in. This, again, is fired by self-intensifying burners. Next is a loose top muffle, with the working space inside the muffle measuring 8 in. × 14½ in. × 5 in. high. This, too, is fired by self-intensifying burners, and is suitable for a working temperature up to 1000° C. Near by is a lead-hardening furnace, provided with a bath 22 in. × 9 in. × 9 in. deep, and having a capacity for 5 cwt. of lead. It is fitted with an anti-oxidation hood. Self-intensifying burners (which can be fixed either at the back or the front of the furnace) are used for the heating, with gas at town pressure. The working temperature in this case can be run up to 600° C. Adjoining is a tempering-plate; the area of the plate being 14 in. × 24 in. The burner, which is of the self-intensifying order, is swivelled, so that it can be moved to any position.

(To be continued.)

SUPPLY OF GAS TO AUTOMOBILES.

By NORTON H. HUMPHRYS.

BEING recently engaged in connection with the installation of filling stations in country districts, it was a disappointment to be prevented from attending the discussion on motor traction at the annual meeting of the British Commercial Gas Association—particularly as, in common with many others similarly interested, I am in want of a lead as to several details concerned in general practice.

The present requirements lie not so much in the direction of a knowledge of the possibilities that await us in the indefinite period so frequently talked of as "after the war," as of a means of prompt compliance with present demands, at a time when our resources are much restricted, that not only gives promise of a new line of business, but is also a way of assisting an urgent national necessity. Therefore, it would be more to the point, instead of crying "stinking fish" by amplifying the obvious defects of the flexible gas container, to recognize the fact that it has come to stay for a long visit, at any rate. Perhaps it is not a thing of beauty and a joy for ever; but if motor users are content to use it, why should gas engineers object? The present need is not so much for a *résumé* of the facts that have been set forth in various ways during the last few months, as for a comprehensive scheme immediately dealing with the situation Obviously, an extensive outlay is not desirable as a start; but the establishment of filling stations does not appear a very serious matter. They will not necessitate application to the obdurate Government authorities for permission to raise more capital. Simple and inexpensive methods might be adopted as a commencement, and developed as experience may dictate. So far as practical working is concerned, a redeeming point in the discussion is the written communication by Mr. Franklin Thorp, and copies of circular notices similar to that prepared by Mr. William Higgs, of Basingstoke [*ante*, p. 335] are appropriate addenda.

There are several details in respect to which some set pattern is desirable—such as the size of the gas supply, which is not necessarily the same thing as that of the union coupler or connection to the container. This appears likely to settle down as 2-in. gas thread. The size of the service pipe and meter decided on will necessarily affect the cost; and the point is, What is the requirement in cubic feet per minute? This has been put at anything between 25 c.ft.—which could be supplied through a 1½-in. service, or with a short run and good pressure through a 1¼-in. service—and 100 c.ft., which would mean a 3-in. supply pipe. A meter of the usual kind would mean a 150-light size for the minimum quantity and a 500-light size for the maximum quantity. I should prefer to leave the question of quick filling until the demand warranted it, and in country districts, at any rate, to start with the lower limit. The probabiiity is that a 2-in service, which would be good for 50 c.ft. per minute and fill a 400 c.ft. bag in eight minutes, would answer all general purposes. But something turns on the number of bags to be filled per day, and the sizes. It is doubtful whether a quicker service would be looked for or appreciated; and there are always little odd jobs, such as oiling or tightening nuts, to be done on the occasion of a "stop."

A comprehensive scheme applicable throughout the length and breadth of the country means taking in all sorts and sizes of gas-works, from the Metropolitan, that sends out its millions per hour, to the village gas-works that scarcely equals a similar quantity in a twelvemonth. If the street in front of the garage is piped with a main of 20 in. diameter or upwards, there is no occasion to be squeamish about a 3-in. or even a larger supply; but the position is different when dealing with a 4-in. or 6-in. main already heavily loaded. I have been asked to arrange a supply to a garage, off a 5-in. main of respectable age, and now supplying several cookers and small gas-engines. In small districts high supply pressures are not the rule, as the holders may be only single lift, not giving more than 35-10ths or 40-10ths. In such circumstances, the instantaneous opening of a 2-in. cock to full bore, at a time when all appliances were in full swing, would be disastrous over a considerable part of the district. Caution must be exercized to avoid interference with the existing business; and in the smallest class of gas-works a smaller supply must be used, or the filling stations must be limited to the gas-works, and supplied direct from the holders.

At a more advanced period, when motorists are quite familiar with methods of connecting and disconnecting the union couplers, and automatic appliances have successfully passed the test of extended experience, it may be safe to dispense with the services of a qualified attendant at the filling station; but so long as the system remains a novelty, it will not be wise to do so. Automatic meters used for this purpose will need to be fitted with an instantaneous cut-off, and an arrangement that will secure a return of the index to the zero point after each filling, irrespective of the fact that an odd fraction of 100 c.ft. might remain after the bag was fully charged. And there should be no important escape or waste of gas remaining in the pipes after filling. We may expect that experience will bring to light the little hitches and difficulties that usually occur in connection with any new departure.

The chief consideration, however, is that the journeying motorist will encounter a wide difference in the heating quality of the gas at various places. Taking one gas-works with another throughout the country, it ranges from 500 to 650 B.Th.U. Much has been said lately about the desirability of uniformity in the composition of the gas supply, on account of the extensive use of atmospheric burners. If one appliance cries louder than others for uniformity, it is the gas-engine when working near to its maximum capacity. A tourist will be much in the position of a gas-engine consumer whose supply is subject to constant variation within these limits. Filling up in one of our largest towns, he may get a 500 B.Th.U. gas; and at a small village gas-works, where blue gas, steaming, and 16,000 c.ft. to the ton are impracticable, and the retorts are worked by hand at temperatures that yield less than 10,000 c.ft. per ton, he may get 650 B.Th.U. The variation may affect him in two ways; and it seems desirable that he should have some knowledge of different qualities of gas, and that a reliable statement of the quality supplied should be exhibited at every filling station, so that he may regulate his arrangements and working to suit. One can scarcely suppose that engines will run satisfactorily on anything within these limits without adjustment to suit the quality.

The bulk of the gas is simply an incidental, and at present a very inconvenient, detail. The real requirement is not so many cubic feet of gas, but so many potential B.Th.U. If he possesses a 400 c.ft. container, the motorist may receive, and carry away, anything between 200,000 and 260,000 B.Th.U.; and his consumption will be in proportion to the quality rather than the bulk. An unusually poor quality of gas may peter-out sooner than he expected, and leave him stranded in a locality miles from the nearest habitation. A happening of this kind would not tend to assist the extended use of gas for motor traction in that neighbourhood. A rich gas may cause trouble by incomplete combustion and carbon in the cylinders. The question of the best way of dealing with variations of quality calls for careful consideration, if the use of gas is to be anything more than merely local; and if satisfactory arrangements be arrived at, there is no reason to suppose that it will be thus limited. In view of deficiencies and delays in respect both to railway passenger and goods departments, the probability is that the congestion will be relieved by an extension of road traffic for commercial purposes.

Various statements are on record as to the equivalent of one gallon of petrol in cubic feet of gas, ranging from 300 to 195 c.ft. Probably something turns upon the skill and experience of the driver, and we may look for a steady improvement. The qualities of the gases concerned, however, are not stated; and part of the variations may be accounted for in this direction.

Gas-works managers throughout the country require something in the way of an official presentment from the British Commercial Gas Association that may form the basis of a comprehensive scheme for ensuring that motorists may rely on having their requirements met in any part of the country, possibly with a few exceptions that should be fully advertised. And at an early date it may be possible to compile such information in handy pamphlet form, for distribution among users of motor-cars.

SCOTTISH GAS COUNCIL.

The Scheme Adopted.

IN connection with the formation of a Scottish Gas Council, a special meeting of the North British Association of Gas Managers was held in the Hall of the Royal Philosophical Society, Glasgow, last Wednesday. The chair was occupied by Mr. ROBERT MUIR, of Galston.

The CHAIRMAN, in opening the proceedings, said that it would be within the recollection of the members present that at the last annual general meeting of the North British Association of Gas Managers the question of forming a Scottish Gas Council was brought forward, and the project very fully discussed. The feeling was unanimously expressed that in Scotland there was need for some representative body, other than at present existed, to deal with important questions as they affected the common interests of gas corporations and companies. The object of the Scottish Gas Council was to link-up the work of existing Associations in Scotland—both technical and commercial. Included in the object was the intention that matters of legislative interest, which hitherto had not been within the province of any one of the Associations, should be adequately dealt with. The Council would be thoroughly representative, and would differ essentially from other existing Associations in at least two features. In the first place, it was necessary to have the services of the most influential members of their profession who were officials of the larger undertakings. These gentlemen were, of necessity, dealing from time to time with matters of great importance; and their knowledge and efforts, instead of being directed for the advantage of their own particular undertaking only, would, it was hoped, be directed to help others through the agency of the Council. Then, again, instead of the Council being formed of gas managers only, conveners of corporation committees, and directors of companies would be included. These gentlemen would be distinctly helpful, as the influence of the corporations and companies themselves would be brought to bear upon the efforts and the work of the Council. It was hoped, also, that thereby financial help would be more readily forthcoming, if this should be required in large amount. The absence of representative corporations and companies in dealing with the wider aspect of the affairs of the gas industry had been regarded as a distinct weakness; and it was only fair to these bodies that their help should be invited. Some criticism had been made that the Scottish Council would interfere with the work of the National Gas Council. This would not be the case. The Council would recognize the National Gas Council as the chief representative body in Great Britain. The Council now proposed would deal immediately with affairs as they were intimately concerned with Scotland, and would in his opinion give added strength, not only to the National Gas Council, but to other bodies, such as the British Commercial Gas Association, the Sulphate of Ammonia Association, &c. It was not convenient, nor was it possible, for the National Gas Council in London to deal satisfactorily with matters peculiarly of Scottish interest. They also made the demand that they should have a voice in the discussion and government of affairs; and this hitherto they had been denied. There was the practical difficulty of the distance from London. They could not expect a man in the South to understand their view of things, and to deal with them as they considered they ought to be dealt with. For example, the regulations of the Coal Controller, as they affected more particularly area No. 19, had created most disturbing conditions of working in many gas-works; and yet this matter had not met with any practical sympathy or support from the National Gas Council. He felt sure that he was only emphasizing the already strongly expressed opinions of the members when he stated that a form of local government was now necessary if they were to fulfil properly their duties. The members would doubtless have read the proposed Constitution and Rules. [See *ante*, p. 361]. The Special Committee were unanimously agreed; and the meeting that day had been called for the purpose of asking their approval.

Mr. ALEX. MASTERTON (Edinburgh), at the outset of the discussion, asked if the members could be given any idea of the views of the National Gas Council on the subject, and any idea as to the financial side of the proposal, as there were bound to be a lot of expenses incurred. Perhaps Mr. Napier could tell them something of the attitude of the National Gas Council.

Mr. J. W. NAPIER (Alloa) said that he had thought it wise at the preliminary stage of the negotiations to consult with the National Gas Council, to obtain from them settled opinions on the project, and to ask whether they had any suggestions to make, At the same time, he had forwarded to the officials proof copies of the rules and constitution of the Scottish Council. On Nov. 12, he received a letter from Mr. Smith, the Secretary of the National Gas Council, stating that "it had not been possible in the short time available to refer the question to the Executive Committee; but your letter has been considered by the Chairman of the Executive Committee, Mr. D. Milne Watson, and also by the Joint Hon. Secretary, Mr. F. W. Goodenough. I am instructed to inform you that, in their private opinion, the suggested constitution and rules of your proposed Council quite meet the case; but you will understand that they cannot speak on behalf of the Council at this juncture. It appears that your rules, as drafted, will not necessitate the alteration of those of this Council." Mr. Goodenough, with whom Mr. Napier had also communicated, wrote: "You will have received an official letter from the National Gas Council stating that, in the personal opinion of the Chairman and myself, your proposals are on sound lines." Mr. Goodenough suggested some minor alterations. In a later letter he said: "I think, with the alterations that you have made, the Scottish Gas Council will be starting upon very sound lines. I am glad to see that you have increased the number of chairmen and conveners that you are putting on the Council. I am sure that you will find this a great element of strength, as we have done on the British Commercial Gas Association."

Mr. HENRY RULE (Kelty) said that one point brought up at the last meeting of the Association was the name of the Council. He understood that at that time the National Gas Council objected to them calling their body the Scottish Gas Council. It seemed to him that they should not call it the Scottish Council, but the National Gas Council (Scottish Branch). The financial position was obscure. They would have to be given financial assistance in some way; and it was quite evident that they were going to depend to a large extent on the National Gas Council. There was evidence there of their inability to deal with some matters that might crop up.

Mr. W. M. WILLIAMSON (Forres) said that if they were going to ask the Waverley Association to take part in the matter, the latter must have some say on the subject. It appeared in the rules that two of their members were to be on the Council. The Waverley Association did not want to have anything to do with it. There should be some correspondence on the subject.

Mr. NAPIER said it was the duty of the Waverley Association to see that they became members of the Scottish Gas Council. It was quite impossible for anyone to believe that any responsible body of men would willingly absent themselves. He expected most of the Waverley members were members of the North British Association.

Mr. J. W. CARMICHAEL (Barrhead) thought that the Committee of the Waverley Association should have been consulted.

Mr. G. R. HISLOP, sen. (Paisley), expressed his agreement with the aims and objects of the new Council. But there were undoubted difficulties in the region of finance. They subscribed to the National Gas Council; but he did not know whether they had also to subscribe to the Scottish Council. However, if they could see their way to raise the necessary funds, he thought they would get over the difficulties. The whole scheme would be of great interest to Scotland. Sometimes they felt that they were overlooked.

Mr. NAPIER explained that the National Gas Council did not at the outset deal with the question of finance in forming their body. No provision was made in the initial stages for finance. Ultimately, the Council, by reason of their duties, found it necessary to call upon the other bodies. This had been done to the extent of £400; and he understood that another £400 had been called for. The question of finance was undoubtedly a difficult one, because they had existing Associations with their large membership requiring subscriptions. It would be a distinct hardship upon gas managers, as officials, if they were asked to contribute to a new Association. He thought it wise to leave the question of finance for future consideration, because the Council, as a Council, would only meet once a year, and only as a Council at times when the business was of outstanding importance. The real work of the Council would be done by the Executive Committee, who were to consist of seven members. His feeling was that for the first year at least personal expenses of these members should be met by the bodies whom they represented. As time went on, and as the influence and benefits of the Council were felt, it was hoped that subscriptions would be forthcoming from the companies and corporations throughout Scotland—for the particular reason that it was these bodies who were going to get the advantages. They would appreciate the difficulties at the initial stage of determining the line of policy in regard to finance. They had the gas conveners of Edinburgh, Glasgow, Dundee, and Aberdeen, together with the conveners of other four representative corporation gas committees, and a director from each of four representative gas companies. These companies and corporations would recognize that their work, if it were to be carried on satisfactorily, must needs be met with an income. He was sure they would see their way to provide it. The question was difficult. The National Gas Council appeared to have had the same difficulty; and they did not provide in their rules any system whereby an income would be provided. Mr. Hislop was not quite correct in saying that a subscription was given to the National Gas Council. Subscriptions were sent to the British Commercial Gas Association and to the Sulphate of Ammonia Association.

A sharp discussion here arose as to whether the North British Association at its last meeting had really decided to form the Gas Council, or whether the matter had been delegated to a Special Committee.

Mr. P. B. WATSON (Wishaw), the Secretary of the North British Association, had ultimately to be called upon to read the minute of the Association meeting, showing that "the meeting approved of the proposal to form a Gas Council for Scotland."

Mr. LAWRENCE HISLOP (Uddingston) deplored the introduction of non-technical men into their technical meetings. If the technical men were not able to advise their various companies and corporations, he did not see that they were going to make anything by having representatives of the companies and corporations on their Council. Further, he considered it was giving very wide powers to any seven men, such as the proposed Executive, to handle any scheme. It seemed to him that the seven would have such large powers that they would do anything they liked.

Mr. NAPIER reminded Mr. Hislop of Mr. Goodenough's letter, in which he said that he was glad to see that it was proposed to increase the number of conveners and chairmen they were putting on the Council, as this policy had proved a great element of strength in the British Commercial Gas Association. It had always been felt that the want of representation on the part of corporations and companies had been a distinct weakness in what they might term the legislative overlook. When influence and support were required, they looked to their corporations and companies. The inclusion of representatives of these bodies was the redeeming feature of the new Council.

Mr. MASTERTON asked if it would not be advisable for each of them to get the consent of his various members. They did not know the position they were going to take up. They might have to fall back upon them for subscriptions.

Mr. HISLOP asked what was meant in the rules by representative gas undertakings? There were only four statutory gas undertakings in Scotland. Were they going to take any account of companies that were non-statutory? Any future legislation in Parliament would more than likely affect private companies.

Mr. NAPIER said representative gas companies were taken to mean gas companies representative as regards size. They might be statutory or non-statutory.

Mr. RULE said that the annual general meeting of the Council was to be held only once a year. It seemed that the Executive Committee were to do all the work. They were only going to call a special meeting of the Council at such times as might be fixed. He thought the Executive might do the work and call a meeting of the whole of the gas undertakings in Scotland.

Mr. NAPIER, referring to Mr. Rule's previous question regarding the name of the Association, stated that he had been anxious not to disturb the equanimity of the National Gas Council, and at the outset he took the opportunity of placing the matter before the Secretary of that body. In none of the communications did Mr. Smith raise any question as to the suitability of the name on his own part or on the part of the Chairman. The only opposition that had appeared on the surface was in the "GAS JOURNAL;" but that was just the measure of the anxiety of the Press as to the importance which the Scottish Gas Council was going to have in the affairs of their industry. Asked, if representative companies for the Scottish Council were to be judged by their size, what the size was to be, Mr. Napier said they would notice that they had members from the North British Association, from the Waverley Association, and from the Commercial Sections. It was the duty of these Associations to appoint representatives that were fitting and satisfactory. The fact that the Waverley Association had two members of Council was almost a guarantee that they would have two members from the smaller gas-works.

Mr. ALLAN REID (Brechin), to test the feeling of the meeting, moved that they should adjourn until the spring, and until after the Waverley Association had been consulted. In view of the small turn-out that night, he thought they had quite enough reason to let the matter rest until April. It could be taken up at the Informal Meeting. Until they got an idea of how much it was going to cost, he thought the matter should be left over.

Mr. LAWRENCE HISLOP thought they should have a full expression of opinion that day.

Mr. NAPIER failed to see what would be gained by waiting till next April. The Council should have been formed years ago. If it had been formed, undertakings north of the Forth would not have been suffering as they were in the matter of the coal supplies. It was the want of influence upon the Coal Controller that had been lacking.

Mr. REID'S amendment was defeated; and the meeting proceeded to the consideration of the constitution and rules, in which very few alterations were made.

On the motion of Mr. WILSON (Motherwell) it was agreed, under Section 4 of Clause 3, relating to the Constitution, to make the beginning of paragraph (*f*) read "the conveners *and managers* of four corporation gas undertakings, and the chairman (or a director) *and manager* of four gas undertakings, whose appointment will be made by the Council. *The conveners (or chairman) must be representing the same company or corporation as the managers appointed.*

Under Section 5, referring to the Executive Committee, it was agreed that the Committee shall consist of *not less than* seven members.

Under Section 6, referring to the secretaryship, it was agreed to alter the wording to read: "The office of Secretary to be honorary. *He shall be a member* of the Council, and the person appointed shall be a member of the gas profession, *and shall have a vote in the affairs of the Council.*"

LIGHT OILS FROM COKE-OVEN GAS.

According to a paper on the "Recovery of Light Oil from Bye-Products Coke-Oven Gas," submitted by Mr. W. H. Wright to the American Gas Institute, there are to-day in the States about 43 plants for recovering light oils; only one installation of any size being in existence which does not produce these oils. For the year 1913, the output in America was estimated at 10 million gallons; while the recovery this year it is thought will approximate 110 million gallons.

Pointing out that the process of recovering the light oils from gas consists broadly in absorbing the mixed benzols from it by bringing it in contact with a suitable absorbing oil, and subsequently recovering them from the wash oils by means of distillation, the author remarks that the process as originally carried out was intermittent; the wash oil being subjected to distillation in batches. This old intermittent process has, of course, long since been replaced by continuous operation, in which the wash oil is circulated through the scrubbers, a still of the type ordinarily used for ammonia distillation, suitable coolers, and back to the scrubbers continuously. It is stated in the paper that the first attempt to obtain benzol from gas was made by Vogel in 1859; the idea being to do it by means of fatty oils, in order to increase the value of these oils for illuminating purposes. The recovery of benzol as such was first suggested by Carvès in connection with his own coke-ovens; a patent being taken out by him in this connection in 1884. In this case, a heavy tar oil was used; and the process was, of course, intermittent. During the following years, similar processes were worked out in France, Belgium, and Germany; and it appears that the first continuous plant of any size was built by Brunck in 1894. From the early nineties onwards the development of this industry throughout Europe seems to have been parallel with the development of the bye-product coking industry—the light oil plant becoming a normal part of such installations. But it required the stimulation of war conditions to bring about a development of the process in the States.

For the purposes of the paper, information was sought from the 43 benzol plants in that country; and the particulars gleaned are summarized. The industry seems to be pretty well standardized in the matter of type of scrubbers, which are in the form of towers from 6 ft. to 24 ft. in diameter, and from 40 ft. to 90 ft. high. They are uniformly filled with wood grids, and the lower 8 ft. to 10 ft. is made to serve in most cases as a reservoir for the wash oil in circulation. The wash oil is admitted by means of a series of sprays; and there are normally two or three of these towers in a series, the wash oil being circulated in counter-current to the gas. Experience has unquestionably pointed to the desirability of having not less than three towers in a series. The quantity of wash oils should be such as to give a saturation of the benzolized oil not in excess of 4 p.ct. From 2 to 3 p.ct. is a better figure. The temperature of the gas and oil are, of course, the important factors in determining the permissible maximum. While in Europe heavy tar oils have been used as the absorbent, in the United States the industry has uniformly adopted high-boiling petroleum oils (known to the trade as "straw oil" or "spindle oil").

So far there is no general practice in the matter of discarding or replacing the wash oil. Some plants discard only the boiler still residue obtained in the subsequent treatment of the light oil, and replace the wash oil merely as this and other losses make it necessary. At other plants, a regular routine of wash oil renewal is followed. In one case reported upon, this routine provides for complete renewal every three months. Plants at which still temperatures of around 135° C. are obtained show better wash-oil results than plants distilling at lower temperatures. The benzol scrubbers in use in the various plants are of such size as to give a velocity of from 1½ ft. to 4 ft. per second, when reckoning that one-half of the gross area of the scrubbers is available for gas flow, and the time of contact of the gas with the oil from 40 to 160 seconds. The contact in the majority of plants runs from 70 to 100 seconds. The absorbing power of the wash oil starts to drop off very rapidly at about 25° C.; so that it is important to maintain the temperature of the gas and wash oil at or below this point, in order to ensure good efficiency. The question of the sequence of the heat exchangers is determined by various considerations. In European plants using tar wash oils, the sequence for the benzolized oil is first through the oil-to-oil heat exchanger, and then through the vapour-to-oil exchanger; while in America, where petroleum wash oils are used, this sequence is generally reversed. The majority of the plants in the United States do not use superheated steam in their light-oil operations; but experience has fully demonstrated the desirability of doing so.

The cooling of the wash oil has been accomplished in one type of American plant by means of direct mixing of the debenzolized wash oil and the cooling water; and this worked out fairly satisfactorily where the still temperatures were high enough to ensure a very good removal of naphthalene from the wash oil. The author approves the tendency manifested to use the single-pipe refrigeration ammonia cooler for cooling the wash oil. It is his opinion that the cooling should be brought about with the wash oil inside the tubes, and the water outside, down to about 40° Fahr., and the remainder of the cooling with the oil outside the tubes and the water inside. Practically all the light-oil condensers have been of the worm type. There seems now, however, to be a tendency to utilize the standard double-pipe ammonia condenser of the refrigeration type for condensers and heat exchangers; and it is remarked that this apparatus will give greater efficiency.

Most of the coke-oven plants, of course, do not supply illuminating gas; but so far as the information goes, the reports indicate that for practical purposes the reduction in heat value may be placed at 10 B.Th.U., and the reduction in illuminating power at 2·3 candles per 0·1 gallon of light oil removed per 1000 c.ft. However, the further loss of these two properties in distribution will be very much less than when distributing the gas as normally produced.

HEAT ENGINES.

The "Thomas Hawksley" Lecture.

The Institution of Mechanical Engineers met on Friday (under sad circumstances) for the "Thomas Hawksley" lecture, which was delivered by Captain H. Riall Sankey, C.B., R.E. A few days previously, Mr. Charles Hawksley passed away; and the Council of the Institution were placed in the dilemma of whether to postpone the lecture or not. In asking the meeting to pass a vote of condolence with the family of the late Mr. Hawksley, the President (Mr. Michael Longridge) said the decision to have the lecture delivered as originally arranged was partly on account of the difficulty of altering the arrangements at such short notice, but mainly because it was felt that it would have been the wish of the founder of the lectures that it should be delivered.

The lecturer traced the development of economics in steam, gas, and oil engines, and steam-turbines, devoting, of course, most attention to steam. Curves and tables were exhibited, showing the various stages of economy in gas-engines, from which it was seen that up to 1897 there was a very rapid advance in economy, due to the improvement in compression and the general effect of better knowledge of design. After that year, however, the

improvement continued more slowly. The suggestion by Thwaite, in 1895, to adopt blast-furnace gas was not taken seriously in this country, but was left mainly to the Cockerill works, of Liege, to open up this field. Unfortunately, many engineers were led to the conclusion that large gas-engines generally were a practical possibility—not recognizing the difference between blast-furnace gas and producer gas. The result was that a large number of firms took up the manufacture of large gas-engines in this country; but a considerable amount of money was lost, and most of them gave it up. Some, however, kept on; and a rapid development in size took place. In Germany and America, in 1907, 5000 H.P. engines were built for driving dynamos and blast-furnace blowing engines. He did not believe that the largest gas-engine ever built exceeded this size, although there was a statement in a paper in 1915 by Prof. Hubert, of Liège, that an 8000 H.P. gas-engine was in process of manufacture by the Cockerill works before the war, and that the main shaft was exhibited at Ghent in 1913.

Extravagant ideas were entertained in the early days of the gas-engine, as a result of the introduction of the Carnot cycle, that the perfect heat engine would be found to be the gas-engine. It was easy to see that the thermal efficiency of the Carnot cycle was of the order of 80 p.ct. At the range of temperatures available in the gas-engine, this was about double the theoretical thermal efficiency of the modern gas-engine. The thermal efficiency of the gas-engine increased with the compression. In the early days, the economical advantages due to high compression could not be realized, because the then method of firing led to pre-ignition, even with low compressions. A lantern slide was exhibited showing the theoretical and practical efficiencies for various ratios of compression. A matter which was frequently misunderstood was that the size of a gas-engine cylinder to develop a given horse-power depends only to a small extent on the calorific value of the gas. The reason was a simple one—the higher the calorific value of the gas the greater the amount of air required for combustion—introducing a proportionately larger amount of nitrogen from the air. Consequently, the calorific value per cubic foot of the explosive mixture was nearly constant whatever the gas might be. It was of the order of from 40 to 50 B.Th.U. per cubic foot.

With regard to the future, Captain Sankey expressed the opinion that the practical limit had been reached in the case of all types of engine, and little, if any, further improvement was to be looked for. The best results obtainable were as follows:

	B.TH.U. PER H.P.-HOUR.
Steam-turbines	14,000
Gas-engines	10,600
Diesel engines	7,700

Both gas and oil engines had reached their limit as to size; but the steam-turbine could be built in much larger units than had yet been attempted. Therefore, notwithstanding the considerably higher heat economy of the gas and oil engine compared with the steam-turbine, the latter would hold the field for large units for land and marine service. The reason for this was that it was a true rotary engine; and it would occupy this position until a satisfactory gas-turbine had been evolved. There had been much theorizing on the subject of the gas-turbine during the last fifteen years, and a few small experimental gas-turbines had been built. There had, however, been no real progress, the difficulty being to obtain, for the blading, material which would withstand the very high temperature of the impinging gas. There was also to be considered the loss due to the compression of the combustible mixture of gas and air, which loss greatly reduced the intrinsically higher thermal efficiency of the internal combustion engine; so that, under the best conditions, it was not likely that the practical economy of the gas-turbine would be more than a slight percentage better than the present gas-engine.

An experimental gas-turbine must be of very large size; and private enterprise would not be justified in embarking upon the great capital expense involved. The point to be kept in mind was the utilization of the world's fuel supplies—coal, oil, and peat—to the best all-round advantage. The recovery of bye-products would only be economical in very large plants. Consequently, it might be expected that in the future coal and peat would be gasified in producers of such a character as to recover the maximum amount of bye-products, and that the remaining gas would be used for generating electric power. Generally, the monetary value of the bye-products was greater than that of the heat-producing element of the fuel. From this, it followed that the small percentage of economical gain in the gas-turbine, if it could be built, would be largely reduced in value. The conclusion, therefore, was justified that the gas resulting after the separation of the bye-products would be used under boilers for generating steam for the driving of large turbo-generators in electric power stations.

"Recent Developments in Bye-Product Coking" forms the subject of a paper to be submitted by Mr. G. Blake Walker at a meeting at 5.30 to-day of the Institution of Civil Engineers.

To suit the convenience of Prof. Henry Louis, M.A., D.Sc., the date of the address on the "Economics of Coal Production," to be delivered by him to the London Section of the Society of Chemical Industry (of which he is the President) was altered from yesterday to 8 o'clock this evening, at Burlington House, W.

BENZOL AND TOLUOL FROM CARBURETTED WATER GAS.

Messrs. R. J. MOORE and G. EGLOFF submitted at a recent meeting of the American Chemical Society some experimental results of the extraction of benzol derivatives from carburetted water gas.

They used a scrubber 10 ft. high and 18 in. diameter, packed with lattice woodwork, through which the oil was circulated; and a coil condenser was fixed at the outlet, with a fall back into the vessel as a preventative against portions of the oil spray being mechanically carried away with the current of gas. A charge of 25 gallons of straw oil was used for each test; and 1000 c.ft. of gas was taken direct from the outlet of the superheater, and measured through a meter before admission to the scrubber. The treated oil was distilled in a 42-gallon still, by steam and direct gentle firing, until a temperature of 180° C. was registered in the space above the liquid. At this temperature, practically all the light oil was separated. A sample of the oil was analyzed, after use in the scrubber and subsequent distillation, and showed no difference other than experimental errors, compared with the composition of the fresh delivery.

The product of the distillation was 0·32 gallon of yellow light oil per 1000 c.ft., possessing the characteristic odour of a cracked oil, and a high unsaturated hydrocarbon content. The proportion that would combine with sulphuric acid (sp. gr. 1·84) was 35 p.ct. The temperature induced by the reaction had to be kept down by the application of cooling agents, so as to avoid evaporation losses or chemical changes. There was reason to believe that the condensate obtained at 180° C. retained 6 or 7 p.ct. of the washing oil.

The following figures were obtained by fractional distillation:

—	P.Ct. by Volume.	Specific Gravity.	P.Ct. Unsaturated.
Below 95° (benzol)	51·8	0·866	46·0
95° to 120° (toluol)	24·1	0·869	18·0
120° to 150° (zylene)	6·0	0·868	24·0

The high percentage of unsaturated olefines was an objection, as it involved a complicated low-pressure washing system and purifying, with the attendant losses. Addition of hydrogen to the blue gas had been shown to be of little use as a means of reducing the olefines. Whittaker and Rittman tried the effect of making gas under various pressures. Egloff and Twomey found that cracking the gas oil under higher temperatures than the usual would to some extent reduce the proportion of olefines. In view of the urgent demands for aromatic hydrocarbons, alterations on these lines might advisedly be considered, in the manufacture of carburetted water gas. Independent cracking of the oil, and subsequent mixing with the blue gas, might prove advantageous; and the benzol fraction obtained from the light oil might be returned to the gas.

One litre of the light oil was carefully saturated with sulphuric acid, neutralized with sodium hydroxide, washed, dried over fused calcium chloride, and distilled in an efficient fractionating column. It contained 22·1 p.ct. of benzene, 20 p.ct. toluene, and 5·1 p.ct. xylene—equivalent to 0·071, 0·064, and 0·016 gallon per 1000 c.ft. of gas respectively, and to rather less than 50 p.ct. of the crude light oil extracted.

COAL SUPPLY IN GERMANY.

The market report on coal and coke appearing in the "Journal für Gasbeleuchtung" (Nov. 3) has the following comments on the conditions then prevailing in Germany in regard to coal supply.

Although the total quantity of coal raised in the various fields during the month of October can have been scarcely any less than in the preceding month, and must have been approximately as much as in times of peace, the quantity delivered has fallen considerably short of that for the previous month—owing to dearth of wagons. Unfortunately, there is no immediate prospect of improvement in the transport situation, as the demand for wagons for the conveyance of provisions still continues to grow. Consequently it seems probable that compulsory measures on the part of the railway administration—such as increase in the demurrage on wagons and ultimately their compulsory discharge—will be unavoidable, as even now the seriousness of the situation is not yet realized in many circles, and there is needless delay in liberating wagons.

The temporary shortage of coal is merely a scarcity of means of transport, as there is now as much coal available for home consumption as there was in the spring of 1914. But it cannot be delivered to consumers. It is hoped, by restricting passenger traffic, to effect an improvement in the goods traffic; and if the increase in fares which has been decided upon does not have the desired result, other steps will be taken.

Unfortunately, the waterways have not been able to relieve the railways, as technical difficulties arose on account of the high water. The Silesian pits were able to do rather better by sales

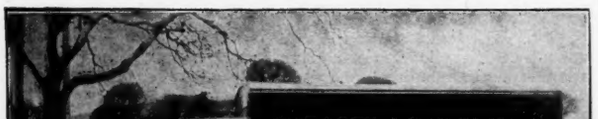
to rural districts; the former prohibition in regard to which has been withdrawn.

The report goes on to say that the requirements of gas-works are estimated by the Coal Distribution Commission on the basis of their known consumption; and gas-works need not therefore fill in the monthly requisitions which other industrial works have to make for quantities of coal, coke, and briquettes in excess of 10 tons a month. These requisitions have to be made to four authorities in the case of coal, and to three for gas coke.

The demand for coke continues greatly to exceed the available supply, and is likely to do so for some time to come, as gas-works may be accorded a preferential supply of coal. Such preferential treatment of gas-works is, however, somewhat less probable than formerly, owing to the State bureaux for gas, water, and electricity works having been taken over by the Imperial Commissioner of Coal Distribution.

The Welsbach Company's Motor Service.

In the issue of the "Commercial Motor" dated Nov. 22 there appeared an illustration—here reproduced from a photograph by Messrs. H. W. Sale & Co., of Chiswick—of an Austin 2-3 ton lorry in gas-mantle delivery service. The lorry belongs to the Welsbach Light Company, Ltd., of Gray's Inn Road, W.C.; and, in



addition to the busy time it has in the service of its owners, the Welsbach Company have enrolled it for the use of the County of London Motor Volunteers, and have arranged for their driver to drive for the benefit of the volunteers one night per week. They have also given their Daimler lorry to the same Corps.

Masonic.—A regular meeting of the Northern Star Lodge, No. 3053, was held on Nov. 23 at the Midland Hotel, Manchester, when the ballot for the Worshipful Master for the ensuing year resulted in the selection of Bro. John W. Morrison, of Sheffield. W. Bro. Walter Whatmough, P.M., of Heywood, was re-appointed Treasurer of the lodge.

Removing Rust from Iron Plates.—According to the "Journal of Engineering Chemistry," rust may be removed from iron sheets or joists by the application of a mixture composed of two parts of sodium thiosulphate and one part of sodium chloride, finely powdered, and wetted only to a sufficient extent to be coherent. If time is no object, the mixture can be left undisturbed until the iron is clean; but the action can be expedited by washing off with water every two or three hours, and scrubbing with a steel-wire brush. A badly corroded plate may be cleaned by this means within 24 hours. A liberation of chlorine takes place slowly, and the action of this gas on the metal is slight; so that, when thoroughly clean, the iron should be washed quite free of salt, quickly dried, and immediately coated with paraffin oil. It is then ready for the application of paint or other protective covering.

Simple Method of Testing and Adjusting Pyrometers.—At the National Exposition of Chemical Industries recently held at New York, the Brown Instrument Company had on view a simple method of testing and rating high-temperature pyrometers. The thermo-couple is immersed to a depth of ½ in. in ordinary salt, contained in a small crucible. Heat is applied; and when a temperature of 1430° Fahr. is attained, the salt begins to melt. This has been officially established by the Bureau of Standards. The fusion-point is 1474°; and when this limit is reached, the temperature remains constant for some minutes, until the whole of the salt is melted. After this, the temperature continues to rise, according to the degree of heat applied. If the instrument under test shows this break to occur at 1480°, it is proved to be 6° too high in its indications, and can be adjusted by the zero adjuster attached to it. The test should be applied periodically to any pyrometer, as changes in atmospheric condition, exposure to vibration, or a slight jar, may have the effect of throwing the instrument some degrees wide of the truth.

EXPERIMENTS IN MIXING GASES.

At the recent meeting of the Pacific Coast Gas Association, Mr. F. S. HONBERGER submitted the results of experiments on a practical scale, in mixing manufactured and natural gases.

An appliance used to verify intimacy of mixture and absence of stratification consisted of a 20-ft. length of 4-in. pipe, plugged at each end, and capable of being divided into two equal parts by a valve at the centre, placed in a perpendicular position when in use. The valve was shut, and the gases admitted respectively into each half of the pipe. The valve was then opened, and the whole allowed to remain undisturbed for fifteen hours, after which samples from the top, middle, and base of the pipe were examined, both by calorimeter and photometer. Manufactured gas of ·5 sp. gr. was first admitted into the top, and natural gas into the bottom half; and in a second test, this was reversed. As the greatest difference recorded by the calorimeter in the first test was 10 B.Th.U., and in a second test 3 B.Th.U., though the difference between the two gases was nearly 400 B.Th.U., the mixing appeared to be fairly complete.

On the large scale, three distinct methods of mixing are available: (*a*) Admission of natural gas to oil-gas generators in operation; (*b*) using natural gas in place of an enricher in the carburetted water-gas plant; and (*c*) mixing at the inlet of the storage holder, the natural gas being first reduced to ordinary low pressure, and then measured through a separate meter. The third plan had the advantage of accurate control; and he had been able to maintain proportions within 0·2 p.ct. over several months.

In maintaining the desired calorific value, and also the proportion of natural gas, the water-gas generators or coal-gas retorts were operated at temperatures that tended to produce considerable quantities of naphthalene; and this was entirely removed by a scrubber before mixing, as in respect to naphthelene the natural gas merely acted as a diluent. The amount of condensation in the distributing mains was less, as compared with a straight manufactured 600 B.Th.U. gas, as the complex oils that go to form easily condensable hydrocarbons are to some extent cracked into fixed gases at the higher working temperatures, and the remainder are diluted by the natural gas.

In considering the effect on the leather diaphragms of meters, it was remarked that a dry gas of any description did not injure them, beyond possibly drying-out the lubricant and rendering them stiff. It was only when a quantity of liquid hydrocarbon was present, that shrinkage of the tissue caused by the astringent effect of such compounds was ever observable. A manufactured gas, even if carrying an excess of moisture, would have no effect; and a natural gas, also entirely free from condensable hydrocarbons, would have no effect beyond acting as a diluent for the moisture.

Examination of the condensate from dry meters showed the presence of a quantity of dirty blue sludge, and of oil of 35·4° Beaume, which was heavier than benzol. It was difficult to dissolve the sludge in hydrochloric acid; and the solution was a dark blue green colour, which disappeared on heating with an excess of sodium hydroxide, with the separation of a bulky brown precipitate of ferric hydroxide. Probably the drippage contained cyanogen compounds soluble in water, which dissolved iron from the interior of the meter, and formed compounds akin to prussian blue, such as were frequently met with in the pipe scale in wrought-iron services or on valve-stems in mains.

TOWN GAS FOR POWER PURPOSES.

Captain R. W. A. BREWER, of the British War Department, contributed a paper at the recent meeting of the Pacific Coast Gas Association, dealing with the use of town gas for power. He remarked that gas-engines were more largely used in England than in the United States, and related some English experiences in construction and installation. He exhibited a table showing the cost of gas power at various rates for gas, calculated on the basis of 17½ c.ft. per B.H.P., as compared with electricity at 1 c. to 6 c. per kilowatt hour.

Cost of Town Gas per 1000 c.ft.	Cost of Gas Power per B.H.P. Hr.	Cost of Electricity per K.W. Hr.	Cost of Electricity per B.H.P. Hr.	
			Motor Efficiency 80 p.ct.	Motor Efficiency 90 p.ct.
Cents.	Cents.	Cents.	Cents.	Cents.
24	0·42	1·0	0·922	0·828
36	0·63	1·5	1·42	1·244
48	0·84	2·0	1·86	1·66
60	1·50	2·5	2·214	2·06
72	1·26	—	—	—
84	1·47	3·0	2·8	2·48
96	1·68	—	—	—
108	1·89	4·0	3·74	3·32
120	2·10	5·0	4·66	4·14
132	2·30	—	—	—
144	2·52	6 0	5·6	4 96

After explaining the advantages of a purely gaseous fuel as compared with liquids or dust—such as homogeneity of the mixture, absence of liability to form carbon or soot, possibility of a higher degree of compression, &c.—he proceeded to quote the results of tests showing that town gas was preferable to gasolene or distillate for testing and running-in new engines. They were conducted under the disadvantage of a temporary mixing device, composed of a Y tube fitted with two adjusting cocks, and therefore do not indicate the best results. A mixed gas of 693 B.Th.U.,

calculated specific gravity ·652, was used; and its composition was: Heavy hydrocarbons, 4; methane, 50; hydrogen, 15; carbon monoxide, 7·4: carbon dioxide and oxygen, 1·4; and nitrogen, 22·2 p.ct. It was expected that the figures would compare favourably with liquid fuel at 4¼d. a gallon. With a B.H.P. of 76·6, and 525 revolutions per minute, the consumption of gasolene was 51 lbs. per minute, or 0·665 per B.H.P. hour.

Engine Tests with City Gas.

Revs. per Min.	B.H.P.	Gas per Min. C.Ft.	C.Ft. per B.H.P. Hr.	Thermal Efficiency.
535	65·4	24·9	22·8	16·9
558	58·6	20·4	20·9	18·4
546	41·0	16·5	24·2	16·1 ¾ load
547	27·3	13·7	30·0	12·9 ½ load
534	55·2	21·2	23·1	17·8
538	40·3	16·6	24·7	16·3 ¾ load
580	29·0	13·2	27·4	13·3 ½ load
577	13·9	12·5	54·0	7·45 ¼ load

American Gas Industry and Toluol Production.

Pointing to the pressing need for the production in America of toluol in ever-increasing quantities, the "Journal of Industrial and Engineering Chemistry" says the main question before the nation now is, "Shall we burn toluol or shoot it?" It is pointed out that at the present time the United States is producing annually approximately 11 million gallons of toluol from the bye-product coke-ovens, which have increased rapidly since the war began. But this quantity, it seems, is not available for the American army. For the new army, the only quickly-available source is the gas plants, which can be equipped in a comparatively short space of time to remove the toluol from gas. Figures quoted by our contemporary are to the effect that the mobile artillery alone will require by September, 1918, at least 22 million gallons. Statistics show that during 1916 roughly 220,000 million c.ft. of gas was produced in the United States; and assuming an average recovery of 0·05 gallon of toluol per 1000 c.ft. of gas, there should be produced from the gas plants within the next four months, if immediate steps are taken everywhere, toluol at the rate of 11 million gallons annually. As, however, this would only amount to one-half the requirements of an army of a million men, everything points to the necessity for a more complete stripping of the gas, so as to increase the yield of toluol. Thus gas companies, public officials, and consumers know there is urgent need for all the toluol that can be supplied. One matter of particular interest to the companies is the statement officially made, that the Government are in a position to assume, in case of an early ending of the war, the investment risks of gas companies through addition to their plants of the necessary equipment for the recovery of toluol.

Calculators of Gas Charges.

Anyone who can facilitate work or save labour is a benefactor to his day and fellows. Calculations of varying consumptions of gas at a given price would take a good deal of time in a gas office without a convenient sort of "ready reckoner." Hitherto such calculations have been arranged in vertical form, with the result that the eyes have to jump about in most erratic fashion to fix upon the varied consumptions for which it is desired to ascertain the charge. Mr. H. Goodfellow, of 57, Brixton Hill, London, S.W. 2, has brought to notice an exceedingly ingenious printed rearrangement with the calculations in horizontal form; the index number indicating the simplicity of finding any series of numbers. The thousands are printed in heavy type; the hundreds in small lighter type. In the top horizontal range of figures, we have 0 to 9 (thousands), in the second section 10 to 19, and in the third 20 to 29. The result of this is that in the first vertical column one gets 0, 10, 20, in the second 1, 11, 21, and so on; and underneath these columns there are the heavier consumptions. In the first column, 30, 40, 50 up to 2000, in the second column 31, 41, 51, and so on. The result is that in the column (say) with the index figure 3, one gets all the numbers ending with 3—that is to say 3, 13, 23, 33, 43, and away up to 193. The sevens or any other figure the same. Thus one is guided by the index figure as to where to look for any given figure or series of figures, and so unnecessary eye strain is averted. Mr. Goodfellow has named this the "Webline" plan. Those who are called upon to do work demanding a calculator of the kind will perhaps place larger appreciation upon it than we can do from want of practical experience. Such appreciation has been expressed; and this is not to be wondered at, seeing that the arrangement is one which strikes the eye by the system and simplicity incorporated in it.

Restrictions on Trading in Metallurgical Coke.—The Minister of Munitions has made an Order, dated Nov. 27, that the war material to which Regulation 30A of the Defence of the Realm Regulations applies shall, on and after Sept. 17, 1917, include metallurgical coke of the following classes and descriptions: Scottish, Nottinghamshire, Lincolnshire, and Cumberland. The regulation is to the effect that no person shall without a permit buy, sell, deal in, &c., the articles specified as "war material."

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Ministry of Munitions and the Supply of New Meters.

SIR,—As many managers are in doubt respecting the interpretation of the circular-letter issued by the Ministry of Munitions under date Oct. 13, 1917 (announcing the rationing of the makers of gas meters, stoves, and fires), as to the procedure to be followed in regard to new meters required for new installations, in contradistinction to new meters required for replacements, Dr. Hazel, the Deputy Controller of the Priority Department of the Ministry of Munitions, No. 1, Caxton Street, S.W. 1, has authorized the Council to inform managers that:

(1) Where a war interest is involved which warrants Class "A," P. 4, or higher priority, a permit should be applied for, and the grounds of war urgency stated to the Priority Department. If the Department is satisfied, it will issue a Priority Certificate "A," P. 4, or higher, and the meter makers will be able to purchase material for such orders over and above their share of the ration granted.

(2) Where a meter is required for some indirect war interest which does not warrant so high a priority as "A," P. 4, or for some purpose of national importance which does not rank for priority as a war interest, application must be made to the Priority Department for *permission to order* on the makers. If such permission be granted and forwarded to the makers, then, and not otherwise, they may, if they are in a position to do so, manufacture the meter from materials purchased by them as part of their share of the ration granted.

(3) Orders for meters required for replacing those beyond repair can be sent direct to the makers, who will, so far as the stocks and labour available permit, manufacture the meters from "ration" materials. Such orders should be guaranteed to be "for replacements only."

(4) Orders for the repair of meters can be sent direct to the makers.

(5) Managers are put on their honour not to order, as for replacements, meters required for new installations. "Wherever possible, apparatus should be repaired rather than replaced."

It will be seen, therefore, that only where inability to get meters repaired, or the fact that meters are beyond repair makes it imperative to get new meters in order to maintain the supply to existing consumers, is it justifiable to order new meters for "replacements." Extensions of business requiring new meters must be sanctioned by the Ministry. Managers are asked to realize that the supplies of materials required for the manufacture of new meters are very short, and that those materials are in urgent demand for war purposes.

W. J. SMITH,
Secretary, National Gas Council.

39, *Victoria Street, S.W.* 1, *Nov.* 29, 1917.

Mr. West's Paper on Carbonization.

SIR,—I am afraid I have "rattled" my old friend, Mr. John West, who declares that he declines to be drawn into a discussion on the merits or demerits of high or low temperature carbonization. This is putting up a poor fight by one who has stepped into the arena and has contributed an interesting paper treating of this very problem—at least, from his own point of view.

In the first place, I will deal with the penultimate paragraph in Mr. West's letter, leaving out the last parting jab at poor "Char," who on "conscientious objector" principles is to be ignored.

If Mr. West will refer to the lecture I had the honour of giving at the Manchester University to the Junior Institution of Gas Engineers on low-temperature carbonization, he will find the expression that, as regards low temperature carbonization as applied to existing gas-works, "I saw through a glass darkly." And I do not see any clearer now.

The fundamentals underlying high and low temperature carbonizing are far apart. The results are different; the aims are different; and the sphere of enterprise is different. And I have never for one moment appealed to a gas engineer or expected him to depart from the principle which yields him his chief financial asset—gas. So Mr. West is quite wrong when he states that I have "ignored the conditions with which the gas industry has to comply." I have not spent all my life as a gas engineer without knowing what these conditions are; and it is because I do know both sides of the problem that I am better entitled to a hearing than perhaps any gas engineer who has only been conversant with one side of the question.

Put shortly, the problem of high temperature turns on the production of gas, more gas, and still more gas. If the bye-products turn up in payable quantities, well and good; but the science of high-temperature carbonization is not based on bye-products. Like Topsy, they "growed." They were never really sought after; they were subservient to the principal product—gas.

Now the last thing sought for by low temperature is gas. It is evolved of exceeding richness in the process; and it is washed, scrubbed, "stripped," and then turned away naked. After a certain quantity has been used for heating the retorts, anyone may have the rest; for, beyond the "wash outs" in the form of the absorbable hydrocarbons it contains, it is of no financial account.

There you have the two problems summed up in a nutshell.

Well, you will ask, "If you do not want gas, what do you want?" First we want a flammable, easily ignitable coke—a fuel which will burn brightly, emit great heat, and render the use of smoky bituminous coals a thing of the past, and make England's cities as bright as Continental ones. But, you will argue, it will take time, much time, to introduce such a fuel to the public.

I am not so sure about that; for our experience shows a big demand. We have only been able to produce some 50 tons a week; but we could

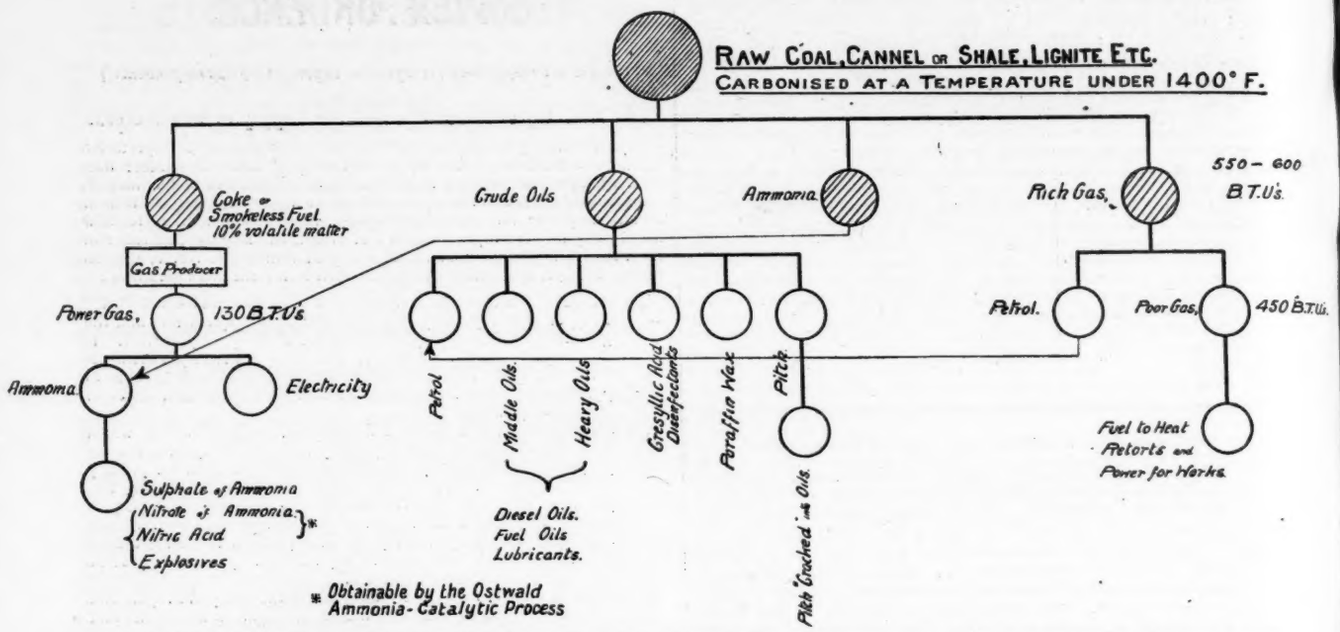


DIAGRAM SHOWING THE RESULTS OBTAINABLE BY LOW-TEMPERATURE CARBONIZATION AND GASIFICATION OF THE COKE.

have sold a 1000 tons weekly. Even last week a small quantity, the residue of some Government trials at our works [No. Mr. West, we do not conduct our tests on a small experimental scale, as you assume; all our trials run on 5 to 50 ton lots, and we carbonize 30 to 50 tons per week] was greedily snapped-up at 45s. per ton. This was not a war episode. Before the war, with fuel at a normal price, contractors quarrelled to obtain this smokeless fuel.

Very well you will continue, you cannot live on the fuel alone; what else do you get? We get from coals, cannels, shales, and lignite, quantities of crude oils varying from 16 gallons in the case of colliery refuse, to 87 gallons in the case of cannels. These quantities yield us petrols, Naval-fuel burning oils, Diesel-engine oils, lubricating oils, paraffin wax, cresylic acids (tar acids), and a valuable bituminous pitch; and, of course, we get the ammonia.

This is all very pretty, you continue; but how can you make it pay with no customers for your gas? In this way. The value of the petrol and oils pays, or almost pays, for the raw coal *plus* carbonization and working expenses, leaving the coke either for sale or for gasification in producers at a mere nominal price.

The value of the petrol (some 2 to 6 gallons per ton of coal carbonized) stripped from the rich gas pays for the "stripping," and the poor gas we have for retort-fuel practically gratis. This "stripped" petrol is added to the petrol obtained by the fractionation of the tar oils, and amounts to a total of some 4 to 8 gallons per ton of coal carbonized.

To make the cycle clear, I refer your readers to the accompanying diagram.

These results are obtained by *bonâ fide* low-temperature carbonization at a temperature of some 900° to 1200° Fahr., in cast-iron retorts of a peculiar form and construction, and working under a vacuum of anything from 10 to 20 in. of mercury.

You can see how great the gulf is between Mr. West's low temperature (?) and the problem that we are endeavouring, and I believe successfully, to solve.

You will further see how silly it is to talk of gas-works adopting low-temperature carbonization, and what an asinine proposal it was for the Ministry of Munitions to make in asking the gas companies to reduce their temperatures.

Now, Sir, I should like to refer to your leading article, in which you state that "it is necessary with low-temperature carbonization to work with small diameter retorts requiring much space, more labour," &c., &c., and that "only by using retorts of small diameter can a good compact coke be obtained." Further you state that "only suitable coals can be used for low-temperature carbonization." But you qualify this by stating "from the economic standpoint of a gas manufacturer."

As I have pointed out, we have nothing to do with the economic point of the gas manufacturer.

Regarding the retorts, we have gone all over this ground long ago. We have established that a tubular retort, 10 in. in dia., at a temperature of 1000° to 1200° Fahr., will not carbonize the core of the coal under from 18 to 24 hours, or even in two days. An 8-in. tubular retort requires 10 to 12 hours, whereas a 5-in. retort will carbonize in four to five hours.

We have thus established that 5 in. is the maximum thickness for low-temperature operations. But to instal 5-in. tubes, considering space and labour, would be folly; so we string our 4 in. to 4½ in. of thickness out; and how we do this is another story.

We have successfully carbonized, of course with varying results, depending on the quality of the raw material, some 200 to 300 different types of coal, cannel, shales, and lignites, not only British, but from different parts of the globe; and we have tabulated results of great value never tabulated before. It has taken five years to complete these data.

Suffice it to say that we have two installations (large ones) on hand for British collieries, one for the Spanish Government, and one for Natal; and we expect within a few days to receive the commission to erect a big plant in France. In all of these installations, retorts taking one ton per charge of four hours will be installed.

In conclusion, Sir, believe me, I am no factious Iconoclast endeavouring to shatter the time-honoured idols of my esteemed confrères in the gas profession. I am always one of them. But my colleagues and myself have been patiently working for years on well-defined lines to establish a new industry and a new outlet for our coals. My knowledge and experience as a high-temperature gas man stand me in good stead. It has enabled me to obtain a clear view of the horizon. Whether our ideals will ever be obtained rests in the "laps of the gods."

F. D. MARSHALL.

19, *Queen Anne's Chambers, S.W., Nov.* 28, 1917.

[With regard to Mr. Marshall's reference to what the "JOURNAL" is supposed to have said, which he emphasizes with quotation marks, we may again present him and our readers with the actual words:

> "In these systems, it is necessary to work with small diameter retorts, which is totally opposed to gas-works economy, both in respect of capital expenditure on carbonizing plant and costs for labour. Using low temperatures and small diameter retorts means that more retort plant must be constructed than is needed for high-temperature working to deal with a given tonnage of coal; that more coal must be carbonized to produce a given output of gas; and thus the inevitable use of small capacity retorts must result in very considerable increase in labour costs. These conditions alone settle the use of the low-temperature processes from the economic standpoint of a gas manufacturer. Moreover, to get the largest yields of those products that alone would justify the use of low-temperature plants, and to secure a coherent coke, suitable coal must be employed which limits the range of such plants."

Comparison will disclose differences between the abbreviated statements and the actual ones.—ED. G.J.]

Steaming in Vertical Retorts.

SIR,—I am glad to again read some of Mr. Settle's refreshing and practical remarks pointing out the many chemical changes that take place in the carbonization of coal. He refers particularly, and I may say correctly, to the composition of the gas from the Kent coals, and the calorific values given in my paper. I was fully aware before my paper was read that they appeared inconsistent, and some explanation may be necessary.

The carbonization tests of the Kent coal were specially made for a Chemical Company, and the products were required for special purposes. The question of the composition of the gas was of no importance to the Company, and only occasionally were tests made during certain alterations of the process of carbonization; and these tests were chiefly conducted to ascertain the carbon dioxide and nitrogen contents of the gas. The analysis of the gas from the Kent coal does not in any way represent an average composition of the gas. It was important that the calorific value of the gas should be taken continuously; and this was done by a recording calorimeter, which was, from time to time, checked by a Junkers calorimeter throughout the whole of the testing.

With reference to Mr. Settle's further remarks about the weight of coke under different pressures of steam, I may say that I had endeavoured to obtain these figures; but the labour difficulties at the time upset the results, which were finally recorded as being unreliable. I hope eventually to make some further experiments on the amount of coke used in the production of blue water gas, which I trust will satisfy Mr. Settle on this important point.

In reply to Mr. Geo. H. Elliott's remarks, I am glad to learn that

he is trying to improve his results, although with another kind of plant. He also points out that "there are undoubtedly two very important factors for consideration, which govern the success or otherwise of steaming in continuous verticals, in order to obtain higher yields per ton of coal carbonized—

(1) The physical property of the coal.
(2) Heat control of the settings.

These two points have been very carefully considered by us, and both important factors are easily overcome.

I pointed out last week that I have not yet come across any coal which could not be satisfactorily and profitably carbonized in Glover-West vertical retorts. We have made experiments with coal from America, Australia, Canada, France, Germany, Newcastle, and I believe from every county in England, Scotland, and Wales, and at the St. Helens Gas-Works with a large proportion of cheap slack coal of the district of very varying qualities, and no difficulties have occurred in carbonizing any of the coals for many years past.

Respecting the heating of the settings, they are completely under control; and we can vary the heating at will at any desired part of the setting to meet any special requirements.

Already many classes of coals have been carbonized and steamed. Mr. Blundell very clearly pointed out in his recent paper what had taken place with different kinds of coal, and how to meet all the different cases. He said:

> **Several classes of coal were carbonized, and the results obtained, with the different classes of coal with the same pressures of steam, were widely divergent. Observations showed that these results were largely dependent upon the character of the coke. It was found that some cokes were acted upon much more rapidly, or gave easier passage to the steam, than others, with the result that, working with a given pressure of steam, a much larger percentage of blue water gas was formed with some classes of coal than with others. Or, to put it in another way, to obtain a gas with a desired percentage of CO, a lower pressure of steam was required when working with some coals than with others. This steam pressure had to be determined by experiment, and by constantly testing the composition of the resultant gas. A hard, dense coke requires a greater pressure of steam than a more open and friable one. This observation coincides with known experience in connection with producer-gas plants.**
>
> **For example, when working two beds of retorts with one class of coal and steam at 10 lbs. pressure, the gas made amounted to as much as 17,500 c.ft. per ton of a gross calorific value of 488 therms. The CO_2 was only 2·4 p.ct., while the CO was 16 p.ct. On the other hand, when using a different class of coal under the same conditions as to heats and steam pressure, the make per ton was 15,000 c.ft. with a gross calorific value of 511·5 therms; the CO_2 content being 2·2 p.ct., while the CO was only 12·4 p.ct. These results emphasize the point previously mentioned—namely, that when dealing with different coals it is very necessary to keep a close watch on the composition of the gas and to regulate the steam supply accordingly.**

Mr. Elliott thinks of passing some superheated blue water gas through his verticals. I consider that, under his present conditions of working, this is a good idea; and I hope that he will quickly follow it out, and give the gas industry the benefit of his experiments.

I may say that it is very encouraging to find that a good number of engineers have started their verticals on the new methods, and have informed me of the progress they are making. When they get fully at work, I hope they will begin to make some experiments on their own account, and not leave too much of this work to the "veteran"—

Southport, Dec. 1, 1917. JOHN WEST.

Neath Gas Stokers' Strike.

SIR,—With reference to an inspired letter in the "JOURNAL" of the 13th inst. from a Local Correspondent, on the recent strike at the Neath Gas-Works (which I had overlooked, but have since had my attention called to it), I wish to state my version of the matter.

The men were out about three days. The so-called staff included about five able-bodied men. The clerical staff included the Financial Officer, one young man, and a number of young girls; and they all performed before the furnaces, with the result that at the end of the third day there was left about 30,000 c.ft. of gas in stock.

The wonderful carburetted water-gas plant, which was promised to overcome all difficulties, was useless, as the men in charge of it were on strike; and as there was no coke on the works for the boilers, coal had to be used before the plant could be started after the men returned to their work. The Minister of Production was called in on the third day by the Corporation to settle their differences; and the men returned to their work.

The inspired correspondent or correspondents took particular care not to insert the letter in the local papers.

Nov. 30, 1917. ANOTHER LOCAL CORRESPONDENT.

[What our correspondent refers to as a "letter," was a contribution to the news columns [p. 335], which was received in the ordinary course of business.—ED. "G. J."]

Increased Wages for Loughborough Gas Workers.

SIR,—My attention has been drawn to a paragraph in your issue of Nov. 27 referring to an application for a further increase of wages from the gas employees of the Loughborough Corporation, in which it is stated that, "it is felt the undertaking can ill-afford to stand the additional demands now being made by the workmen."

If there is such a feeling, it is not shared by the Gas Committee; for the men's request was, on coming up for consideration, granted without any opposition, and has since been unanimously confirmed by the Town Council and the men are now being paid the bonus asked for.

E. ONIONS, Engineer and Manager.

Gas-Works, Loughborough, Nov. 30, 1917.

REGISTER OF PATENTS.

Removing Naphthalene from Hydrocarbons. No. 109,836.

HEYL, G. E., of Kingsway, London, W.C.

No. 13,589; Sept. 25, 1916.

In this process for removing naphthalene, more especially from the middle and heavier oils distilled from coal tar, the oil, after being subjected to the usual neutralization process by being mixed with dilute caustic alkali, is further treated with concentrated or solid caustic alkali in a proportion not less than sufficient to neutralize the small percentage of tar acids which have not been eliminated by the dilute treatment. To economize the concentrated caustic alkali, the oil (prior to the treatment with concentrated caustic alkali) is, after the dilute treatment, preferably cooled to about 0° C., which causes a large proportion of the naphthalene to separate out, from which the oil is freed by decanting or pressing. This treatment with the concentrated caustic alkali may be effected either before or while the oil is being redistilled.

When treated with concentrated caustic alkali before the distilling operation, the oil, mixed with the alkali (the amount of which will depend on the quantity of tar acid remaining after the dilute treatment as determined by analysis), is preferably heated to a temperature not exceeding the distilling temperature of naphthalene—for instance, in a vessel fitted with a reflux condenser. The oil may, however, be treated with the concentrated caustic alkali in the cold condition; but the cold treatment necessitates the oil standing considerably longer than in the case of the hot treatment.

On cooling (or in the cold treatment after standing about from ten to thirty minutes) the oil is decanted or pressed-out from a separated residue which contains the residual naphthalene. Alternatively, the oil may be treated with the concentrated caustic alkali in the still in which the redistillation is effected. In this case, the residual naphthalene held by the residual tar acids, which by the process are neutralized by the concentrated caustic alkali in the still, is deposited in the condenser.

When the treatment is effected prior to the redistilling, it is preferable to have a further small quantity of concentrated caustic alkali with the oil in the still, "as this has been found to promote the retention in the still of the dark colored substances contained in the oil and to prevent same coming over into the distillate."

Either caustic soda or caustic potash may be used as the dilute or the concentrated caustic alkali. The tar oil above referred to is the fraction which distils from coal tar between 170° and 270° C.

Station Meters.—No. 105,899.

HINMAN, C. W. & W. H., of Winchester, Mass., U.S.A.

No. 2843; Feb. 26, 1917. Convention date April 27, 1916.

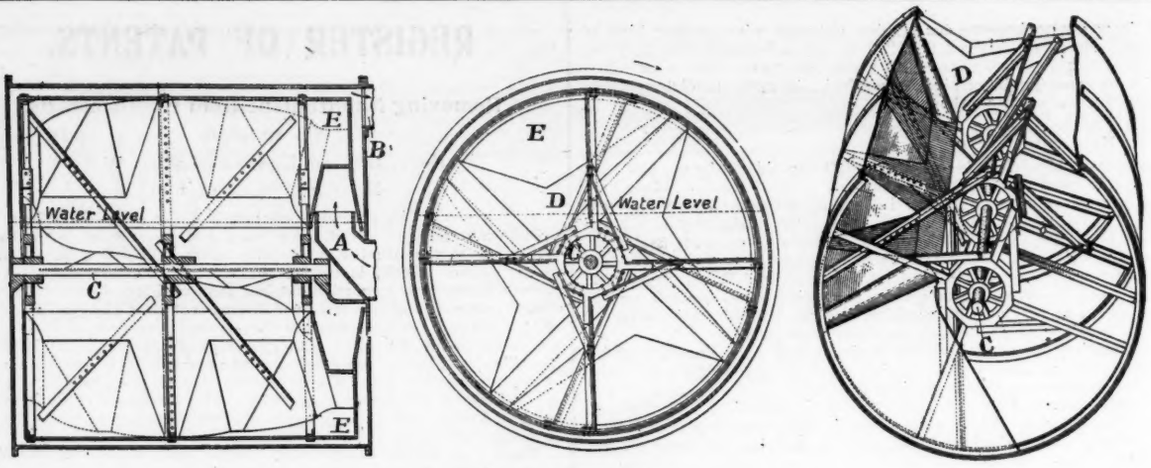
This invention relates to station meters in which the measuring drum is provided with internal division walls and is rotated partially submerged in water. There are a plurality of alternate sections angularly disposed relatively to one another, and a plurality of adjacent sections each obliquely disposed relatively to the axis and to the other sections—the sections being so relatively arranged with respect to one another as to prevent the pocketing of gas between adjacent sections.

A vertical longitudinal section of the meter, an oblique perspective view of the revolving drum (with a portion of the shell broken away), and a transverse vertical section are given on p. 468.

The meter comprises a stationary cylindrical casing having at one end an axial gas inlet pipe or "dry-well" A and the outlet pipe B near the periphery. It is provided in its interior with bearings for a shaft C of the revolving measuring drum, the greater part of which is submerged in the water, which fills the casing to a level slightly below the upturned end of the inlet pipe. The revolving drum comprises a cylindrical shell provided on its interior with division walls to form measuring compartments or pockets, and rigidly supported upon the shaft. The division walls are composed of a plurality of sections angularly disposed with relation to each other—the middle section co-planar with the axis, and the end sections parallel to the axis. Adjacent and between these sections are other sections, all oblique to the axis of the drum and angularly arranged with relation to each other. The inlet end of the division wall is provided with the end wall D, which is nearly perpendicular to the axis of the drum and is connected with the inlet end section of the division wall by a curved section. The end wall is also provided with right-angle portions parallel to the axis of the drum which form internal walls or partitions of one of the pockets E which surround the "dry well."

The operation of the meter is as follows: The gas enters through the "dry well," from which it passes into the inlet chamber and thence into each measuring compartment or pocket formed between the adjacent division walls of the revolving drum as the inlet port rises above the water. The pressure of the gas on the leading wall of the compartment causes the drum to revolve until the compartment is entirely above the water-level, except the inner edge of the long radial section of the wall. The compartment is now completely filled with gas; and as the drum continues to revolve, the inlet port is carried beneath the water level, after which the outlet port rises, permitting the gas to escape through the outlet port into the gas space between the drum and the casing, and to flow back toward the inlet end to the outlet pipe B. The cubical capacity of the compartments being known, it is only necessary to count the number of revolutions of the drum to measure the gas passing through the meter.

By forming the division walls of a plurality of differently inclined sections with their inner edges in line and substantially parallel to the axis of the drum, and with intermediate or adjacent sections obliquely inclined to the axis and to one another, a wall is provided which, approximating a spiral on its outer portions, not only imparts a high degree of strength and rigidity to the drum, but also offers a minimum



Hinman's Statio Meters.

of resistance as it enters or leaves the water—thus reducing the power required to force the division walls through the water, and permitting a higher rotative speed, with corresponding increase in measuring capacity, without danger of distortion or damage to the drum. These are, of course, matters of importance, as meters of this type are of large size, and have to operate under a very low pressure of gas.

The method of supporting and bracing the drum is said to be a feature of the invention, as "it affords a light, strong, and rigid structure which holds the drum firmly in shape, permitting lighter weights and higher rotative speeds than have been possible with prior constructions."

Distilling Coal, Wood, Peat, &c., and Obtaining Liquid and Solid Products.—No. 110,217.

THOMAS, W., of Nanaimo, British Columbia.

No. 15,450; Oct. 30, 1916.

This invention relates to a process for distilling coal, wood, &c., by the direct contact of hot gas with the material for the production of smokeless desulphurized fuel and a recovery of bye-product liquids used in the manufacture of high explosives, dyes, and disinfectants.

The invention consists in rapidly liberating gas and vapour from any materials containing a large percentage of volatile products, condensing and collecting the hydrocarbons (such as benzol, toluol, and creosote liquids), washing, scrubbing, and purifying the gas to remove ammonia and sulphur compounds, and then returning the cool, purified lean gas and using it—first for cooling the hot distilled gaseous products in a double surface condenser, causing condensation of volatile products into pure liquids, and at the same time heating the gas, and then further heating such gas (either in pipes or in brickwork regenerator chambers) to the desired temperature, and then distributing it at a controlled and uniform temperature through, and in direct contact with, a body of material undergoing distillation, and to which external heat may at the same time be applied.

Gas-Heated Soldering Irons.—No. 110,250.

KEITH, J. & G., of Farringdon Avenue, E.C.

No. 18,445; Dec. 27, 1916.

This invention has for its primary object to provide a construction of soldering iron which offers the advantage of "convenience of ignition and adjustment of the flame and obviates or minimizes the corrosion of the untinned surface of the bit."

It has previously been proposed partially to envelope the bit of a soldering iron in a casing—as, for example, in patent No. 3858 of 1904. According to the present invention, the bit is formed with outlets for the products of combustion and an envelope adapted in the use of the soldering iron to enclose the bit in an inert atmosphere, but slidable to expose the outlets—simple means being provided for adjusting the position of the envelope.

Obtaining Products from Waste Hydrocarbonaceous Residues Produced in the Rectification of Crude Benzol.—No. 110,636.

SHEARD, J. T., of Birley Carr, near Sheffield.

No. 16,556; Nov. 18, 1916.

This invention relates to the utilization of the waste residual substance produced when crude benzol and homologous hydrocarbons rectified by live steam distillation are treated as described in patent No. 104,999, the specification of which described a method of purifying the objectionable waste effluent which issues from rectification stills, by mixing with it a solution of a salt of alumina, and, when required, sufficient ammonia or other alkali to make the mixture slightly alkaline, "whereby the effluent is separated into a clear water fit to be discharged into any water-course, and an oily residue or precipitate which has hitherto been thrown away as valueless." The patentee states that he has now found that this waste oily residue can be converted by simple processes of distillation and purification into valuable products.

The present invention therefore consists in submitting to distillation the residue referred to, whereby matters volatile below 280° C. are removed, and an oil suitable for lubricating purposes is obtained. The invention further consists in submitting the residue to fractional distillation, and separating the fraction distilling below about 120° C. (probably benzol and its homologues) from the fraction distilling below about 280° C., and afterwards separating from the residue a lubricating oil.

In carrying the present invention into effect in one form, the residual material is treated in any kind of still, such as is used for distilling coal tar. The still is heated by direct fire, and is provided with the necessary condenser, &c., for cooling and separating the volatile products of the distillation and with suitable arrangements for running-off the hot residue from the still at the end of the operation.

It is preferred to carry the distillation up to a temperature of about 285° C., as shown by a thermometer whose bulb is immersed in the issuing vapours at the still-head. In this typical example, the condensed products consist of water to the extent of about 60 p.ct., with about 3 p.ct. of light hydrocarbons (probably benzol and its homologues) coming off below 120° C., and about 4 p.ct. of heavier hydrocarbons between this temperature and 285° C. or thereabouts. The residue left in the still, amounting to about 33 p.ct., is run off, and (after being partially cooled) is either filtered from the sediment it contains or else sufficient time is allowed for the sediment to settle out of it. When thus filtered or settled, the residue consists of an oil having a specific gravity of 1·060 or thereabouts, and "having such a consistency as to make it very suitable for use as a lubricant for steam-engines and other machinery."

Gas Burners or Lamps.—No. 110,585.

MUNDELL, A. R., of Bucklersbury, E.C.

No. 15,149; Oct. 24, 1916.

The inventor proposes to provide a reflector adapted to bear on, or engage with, the mantle supporting ring or the lugs on it for the purpose of locking or retaining the mantle in its supported position against accidental displacement or vibration. The reflector is in the form of a flat or coned disc having a centrally disposed sleeve or cylindrical part, and the lower portion of the sleeve is shaped so as to engage with the lugs on the mantle ring when supported on the burner tube projections in the usual manner, and thus securely hold the mantle against vibration or accidental or intentional displacement. In a modification, the reflector is of conical shape, and its lower end is provided with slots or notches to receive the lugs on the mantle ring, and thus support the mantle in position; a ring or sleeve being provided on, or associated with, the reflector for bearing on the mantle ring, or the lugs on it, so as to lock or retain it against displacement.

Extraction of Cyanides from Ammoniacal Liquor. No. 110,819.

BAKER, H., of Barrow-in-Furness.

No. 16,906; Nov. 25, 1916.

The patentee claims a process of treating crude ammoniacal liquor consisting in adding an alkali or earth alkali (or an excess of alkali or earth alkali) and heating to recover the ammonia in any well-known way, and then further boiling or re-boiling the residuary or effluent liquid and adding one or more salts of the following metals: Silver, aluminium, tin, nickel—to obtain the corresponding cyanides. The specification points out that the cyanides extracted on this further treatment settle down in the form of mud or precipitate.

The waste or effluent liquor obtained from ammonia recovery plants is in the alkaline condition; and the object of this invention is to treat the effluent liquor in this condition—that is to say, no acids or acid gases are used to bring about chemical action, as the process of further boiling or re-boiling the alkaline effluent liquor does away with the "troublesome and expensive method" of adding the acids or acid-gases. "It is quite understood that the ammoniacal liquor used in the first place is in the crude condition."

It has before been proposed, he points out, to treat the effluent from ammonia stills with a salt of barium at a high temperature, and also with the salt of a metal such as iron, zinc, or copper, so as to cause a precipitation of insoluble ferrocyanide or sulphocyanide—this treatment with the metal salt being effected before, during, or after the treatment with a barium salt.

Natural Draught Regenerative Gas Ovens and Burners.—No. 110,825.

HALKETT, R., of Glasgow.

No. 17,455; Dec. 5, 1916.

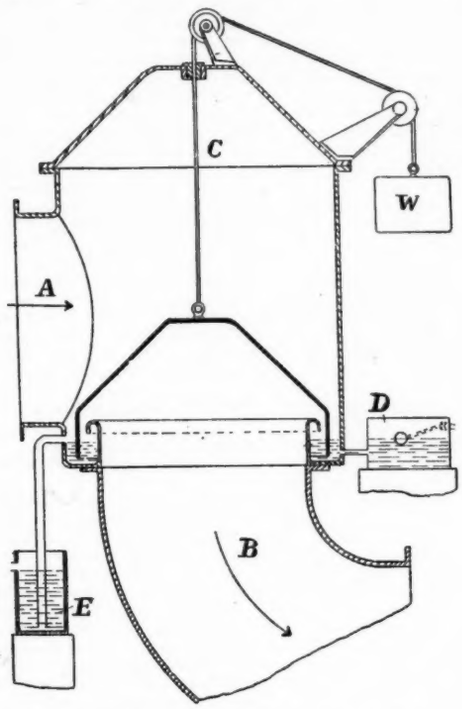
The inventor's object is to construct an oven in such wise that the waste gases will be used in extended flues to assist in raising the temperature and to counteract heat losses. The secondary air flues are constructed to force the air to the centre of the oven, and then back to the burners, and thus cause a higher temperature to be obtained than would be the case when the secondary air was carried direct to the burners. The air valves and damper, being interconnected, ensure that a regular and correct quantity of secondary air will pass into the oven; the altering of the air-valve actuating the damper and *vice versâ*. The burners are of a type wherein the air-ports are closed when the gas is shut off and so ensure that no cold air will pass into the oven when the gas is turned off.

Control Valves for Gas-Mains.—No. 110,859.

HEENAN AND FROUDE, LTD., and HEENAN, H., of Manchester.

No. 2936; Feb. 28, 1917.

This control valve is applicable for gas-mains when charged with dust and (or) with a hot gas such as a furnace gas. It consists in arranging a seal of mercury around the valve; water being allowed to flow over the seal when in use in order to carry away from the surface of the mercury any impurities deposited by, or collected from, the gas and to keep the mercury cool.



Heenan and Froude's Control Valve for Gas-Mains.

The valve is constructed with an inlet A and outlet B, closed by a valve of the mushroom type controlled by a wire rope C passing over pulleys to a counterweight W. The flanges of the valve are carried down in the form of a curtain; and the bottom edge dips into a trough (on the inside of the valve body) containing mercury to form the seal. The trough is provided with inlet and outlet on either side of the valve casing to allow a continuous supply of water to pass through the trough and carry away from the surface of the liquid any impurities collected from, or deposited by, the gas. The inflow of the water is controlled by a tank D with a ball cock; while the outflowing water preferably passes to an additional tank E forming a liquid seal to prevent any escape of gas but at the same time allowing the liquid to run to waste.

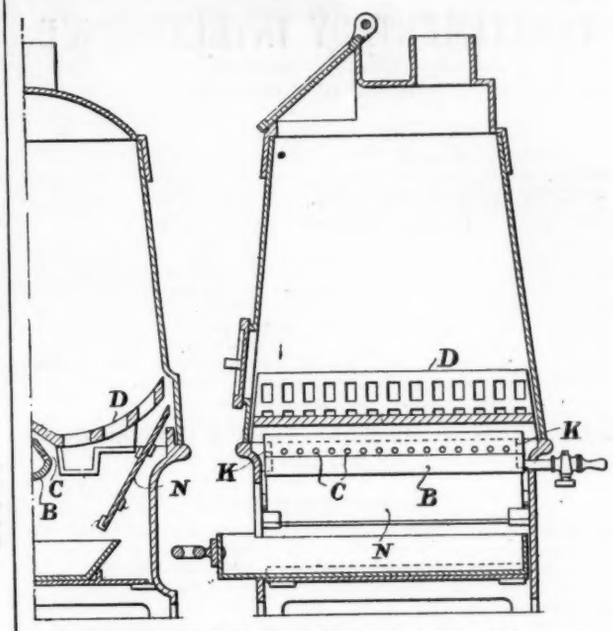
Gas-Fired Incinerators.—No. 110,871.

FLETCHER, RUSSELL, & CO., LTD., FLETCHER, T. W., and BANKS, W., of Warrington.

No. 4411; March 27, 1917.

An incinerator according to this invention comprises a base fitted with a central straight gas-burner, having lateral jets, and a grate curved upwards from about the middle to either side; an upwardly-tapered body portion fitting into, or on, the base, and provided with an aperture fitted with a door; an ash pan fitted in the base; and a top fitting into, or on, the body portion and provided with a charging opening fitted with a door and a chimney or flue for the escape of the products of combustion.

The grate D (as shown) is of inverted **V**-shape at the middle to fit over the burner B, and to direct the material to either side as it is



Fletcher and Banks (Fletcher, Russell, & Co.) Gas Incinerator.

consumed and gradually settles down. The removable grate is supported on lugs K on the base. An ash-pan below the grate receives the ash, and inclined plates N direct the ash and any moisture passing through the grate into the pan. The upward taper of the body portion E, in conjunction with the lateral arrangement of the jets C of the burner, prevents the material from bridging when it cakes.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Nov. 28.]

Nos. 16,981—17,381.

ALDRIDGE, J. G. W.—"Charging-machines for gas-retorts, &c." No. 17,189.

ALLDAYS & ONIONS PNEUMATIC ENGINEERING CO.—"Gaseous or liquid fuel burners." No. 17,139.

AYTON, F. R.—"Boxes for mantles." No. 17,184.

BAGLEY, S. A.—"Gas producer and purifier." No. 17,264.

BARTON, T. H.—"Safety valve and alarm for low-pressure gas or fluid containers." No. 17,130.

BATES, W. R.—"Revolving machine with internal conveyor for drying, carbonizing, purifying, screening, &c." No. 17,064.

BRANSOM, T.—See Bagley. No. 17,264.

GLOVER, S.—"Vertical retorts." No. 17,103.

HARVEY, L. C.—"Furnaces heated by gas." Nos. 17,302, 17,303.

HELPS, G.—"Manufacture and treatment of coal gas." No. 17,341.

HEMINGWAY, H. W.—"Desulphurization of gases, &c., containing sulphuretted hydrogen." No. 17,165.

HIGGINS, W.—"Coal and paraffin gas carburettors and vaporizers." No. 17,279.

HILLER, H. K.—"Distillation of coal, &c., for the manufacture of motor gas, and utilization of residual products." No. 17,054.

KILNER, R. R.—"Collapsible gas-containers for automobiles." No. 17,219.

MORGAN CRUCIBLE CO.—See Harvey. Nos. 17,302, 17,303.

NICHOLSON, A.—See Alldays & Onions. No. 17,139.

PEASE, E. L.—"Heat treatment of coal, &c., for production of oils, combustible gases, ammonia, &c." No. 17,093.

SMITH, F. G.—"Gas-producer, &c., fire-grates." No. 17,229.

TURNER, C.—"Processes of fractional and of destructive distillation." No. 17,298.

WALKER, H. R. I.—See Bates. No. 17,064.

WELCH, W. H.—"Converting heavy oil into gas." No. 17,215.

WELLMAN, SEAVER, & HEAD.—See Smith. No. 17,229.

WEST, J.—See Glover. No. 17,103.

WILD, J. E.—See Kilner. No. 17,219.

WILD, W.—See Glover. No. 17,103.

WILKINSON, F. A.—"Gas-containers for motor vehicles." No. 17,252.

WILSON, W. A.—"Gas, &c., taps." No. 17,249.

WILSON, W. A.—"Tap or regulator." No. 17,250.

Chelmsford and Directors' Fees.—In a report to the Chelmsford Town Council, the Gas Committee stated that the Town Clerk had given the purport of an interview he had had with Mr. A. S. Duffield, the Chairman of the Chelmsford Gas Company, with reference to an account of £25 12s. 3d. received from the Company for expenses incurred during the quarter ended June 30 last. The Committee were of opinion that the remuneration of the Directors charged in the account, at the rate of £10 10s. each per annum, was excessive, having regard to the fact that the Directors have already received compensation for loss of office, and in future the number of Directors' meetings will be considerably reduced, and their duties will be practically of a formal nature. The Committee decided to recommend that the Company be asked to fix the remuneration of the Directors at the rate of £5 5s. each per annum.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

Mond Gas (No. 2) Bill.

The South Staffordshire Mond Gas (Power and Heating) (No. 2) Bill was, on Monday of last week, read in the House of Commons a second time, and committed to the Unopposed Bills Committee.

Incandescent Burner Import Licences.

General CROFT asked the President of the Board of Trade whether licences were being issued by the Board for the importation of inverted burners; and, if so, whether such licences had been granted to naturalized or unnaturalized Germans in other countries.

Mr. WARDLE, in reply, said that licences were being issued to importers in the United Kingdom for the importation of incandescent burners to the extent of 50 p.ct. of their imports in 1916. Import licences were never given to firms abroad.

NOTICES GIVEN FOR BILLS (SESSION 1918) RELATING TO GAS SUPPLY.

[Continued from pp. 421-2.]

Basingstoke Gas Company.—Notice is given by the Basingstoke Gas Company of a Bill to alter the existing provisions as to sliding-scale, standard price, and standard dividends, with provision for the payment of minimum dividends on the ordinary stock.

Brixham Gas Company.—Application is intended to be made to Parliament by the Brixham Gas Company for leave to bring in a Bill to empower the Company to maintain the electrical generating station and other works belonging to them upon land described; to substitute a calorific value test for the illuminating power standard; to authorize the raising of additional capital; to charge differential rates for gas; to make further provision for the cutting-off of supplies, &c. The Company also wish to be empowered in any year, after paying the full dividend on the preference shares for that year, to apply profits which would be available for a dividend on the ordinary shares (including any sum debited to the profit and loss, net revenue, account as "suspense account for unpaid preference dividends") in the payment of dividend on the preference shares in respect of any year or part of a year for which no dividend may have been paid on such shares.

Cannock Gas Company.—The Cannock, Hednesford, and District Gas Company will apply for a Bill to alter the existing provisions as to sliding-scale, standard price, and standard dividend, and to provide for the payment of dividends at minimum rates.

Hastings Gas Company.—A Bill is to be promoted by the Hastings and St. Leonards Gas Company to authorize an increase in the dividend payable by the Company without regard to the price charged for gas, and to make such other financial provisions for the relief of the Company during the period of enhanced cost of production occasioned by, or arising out of, the war as the Bill may provide. The Company also wish for an alteration or enlargement of their powers with reference to the creation and issue of shares or stock and debenture stock, and authority to increase the rate of interest payable on debenture stock.

Longwood Gas Company.—Notice is given by the Longwood and Slaithwaite Gas Company of their intention to promote a Bill for an alteration of the existing provisions as to sliding-scale, standard price, and standard dividends, and to make provision for the payment of dividends at a minimum rate on the ordinary stock.

Southampton Gas Company.—The shortest notice of any is that given by the Southampton Gas Light and Coke Company, who will apply for "an Act to provide for an amendment or increase as from such past or future date as the intended Act may prescribe of the price or prices, or maximum price or prices, fixed for the supply of gas by the Company."

PROVISIONAL ORDER APPLICATIONS.

Arlesey Gas Company.—The Arlesey Gas Company will apply to the Board of Trade for a Provisional Order to change the name to the Arlesey and District Gas Company; to extend the limits of supply; to enable the Company to acquire the undertaking of the Shefford Gas and Coke Company, Ltd.; to substitute a standard price with sliding-scale for a maximum price, and a calorific for the illuminating power standard. Further capital powers are sought, as well as the right to charge differential prices for gas.

Llandrindod Wells Gas Company.—Authority will be sought by the Llandrindod Wells Gas Company, by means of a Board of Trade Provisional Order, to substitute a standard price with sliding-scale for a maximum price, and a calorific power standard for that of illuminating power. Additional capital and borrowing powers are desired, including the right to issue redeemable preference and debenture stock. There will be clauses relating to variation of price according to the purpose for which gas is supplied, and to regulate procedure in other matters.

Stirling Gas Company.—Application will be made to the Board of Trade by the Stirling Gas Light Company for a Provisional Order to repeal, alter, or amend the standard or maximum price of gas and rate of dividend. The Company will ask to be authorized to make additional charges for gas without being under any obligation to decrease the dividend payable in respect of the same half year, and to pay the maximum or any other rate of dividend irrespective of the price of gas.

LEGAL INTELLIGENCE.

PREFERENTIAL CHARGES FOR ELECTRICITY.

APPEAL AGAINST THE HACKNEY JUDGMENT.

The Attorney-General (at the Relation of the Gas Light and Coke Company) v. The Metropolitan Borough of Hackney.

(*Before Lord Justice* SWINFEN EADY, *Lord Justice* WARRINGTON, *and Lord Justice* SCRUTTON.)

In the Supreme Court of Judicature, Court of Appeal, last Thursday, appeal was made from the judgment of Mr. Justice Astbury, in the Chancery Division of the High Court, in July last, in an action in which the plaintiff, suing at the instance of the Gas Light and Coke Company, complained that certain differentiation charges made by the defendants in the supply of electric energy were in breach of the Electric Lighting Act of 1882, and consequential relief and an injunction were sought. The action in the High Court was dismissed with costs. A report of the judgment appeared in the "JOURNAL" for July 31, p. 198.

Mr. COLEFAX, K.C. (with him Mr. PERCY WHEELER), said this was an appeal from the judgment of Mr. Justice Astbury, dismissing the action with costs. Shortly stated, the point had reference to the charges for electricity that were made by the Borough of Hackney—whether or not in their charges for power they infringed the provisions of sections 19 and 20 of the Electric Lighting Act. Plaintiffs' submission was that the learned Judge had not given effect to the judgment of the Court of Appeal in the Long Eaton case, and, further, he had unduly made distinctions between that case and the present one. In the Long Eaton case, the facts were that persons using power for running their lace machines, if they took all their light from the Company, got it at a cheaper rate; while, on the other hand, if they only took it for one purpose they did not get it on the cheaper rate. The Borough of Hackney had given to the power user a rebate in respect of lighting up to the extent of 20 p.ct. of the energy used for power, thereby giving that user a benefit over one who only took electrical energy for light. The charges were divided under two heads—one for light and one for power, with alternatives for lighting. The circular went on to say that consumers paying under this scale (that was, for power) were allowed to use 20 p.ct. of the energy consumed for lighting. Prior to the action being brought, the circular had been amended by stating that, in respect of the power charge limiting the right to take 20 p.ct. of the energy for lighting, it should be taken for the factory where the power was used, and from the same meter. There was really no change, only an alteration in the wording of the circular. Practically 20 p.ct. was a maximum figure for a factory for lighting purposes.

Lord Justice WARRINGTON: They get their lighting for nothing if they pay for power?

Mr. COLEFAX: Not quite; they pay ½d. per unit.

Lord Justice WARRINGTON: One halfpenny per unit would cover the cost of both lighting and power?

Mr. COLEFAX replied: Quite so. The circular stated that the fixed charge was £1 per quarter per kilowatt of maximum power demanded, and a charge for electric energy used of ½d. per unit. After pointing out the difference between load factor and diversity factor, Counsel said a power user employed a better diversity factor, insofar as the use of power was considered, than a light user; but so far as the light user was concerned, it was probably worse than the ordinary user of light. Plaintiffs admitted that a power user in respect of the use of electrical energy for power had a better load factor and a better diversity factor than a light user under ordinary circumstances; but the power user, when he used light, worsened the position at the central power station, and, in fact, *quâ* the user of light, he was no better for the power station than, if so good as, the ordinary user of light and the non-power user of light. Their broad proposition was that the Borough of Hackney, having regard to the Long Eaton case, were not entitled to give to a power user a preferential charge in respect of light.

Lord Justice SWINFEN EADY asked what was the current charge for light.

Mr. COLEFAX said a non-power user, using light, paid twice what a power user would pay for light. He did not complain of there being a cheaper rate for power than for lighting—that was a proper distinction to be drawn, as the two were not similar; but he did object to the 20 p.ct. privilege, as that was giving to a power user a preferential charge for light as contrasted with a non-power user, and was an inducement to the power user to cheapen the cost of his power by taking light without any corresponding benefit to the station. In the Court below, evidence was given to show that the charges for power made by the Borough of Hackney resulted in a loss; but as the learned Judge was of opinion that the evidence was irrelevant, counsel said he should not go into that part of the case. He then called attention to the Long Eaton case, and submitted that it was on all-fours with the present action. Having referred to portions of the evidence given in the Court below, the hearing was adjourned.

Friday, Nov. 30.

Mr. COLEFAX, resuming his argument this morning on behalf of appellants, having read further passages from the evidence given at the trial, and the judgment delivered by Mr. Justice Astbury, submitted that the learned Judge had not given effect to the Long Eaton case, or he (Counsel) had evidently failed to make clear the position he took up—viz., that plaintiffs were within the *ratio decidendi* of the Long Eaton case. Broadly put, his Lordship's proposition was this: Here is a user who is taking power, and if he takes light he is not really getting preferred terms, as this was all part and parcel of the

terms given him when he became a power user. Now this was not the right way of looking at it, as it entirely overlooked the effect of the charge. Electric light undertakings were anxious to get light users, just as they were anxious to get power users. They comprehended by their tariff the case of a person who was not minded to take power from them, but who took light; and they altered their charge as an inducement for him to take power by making the charge for light cheaper. This was exactly the Long Eaton case; and he failed to distinguish the present case from that one. Here there were two charges, and one was being held out as an inducement to persons to take another supply.

Lord Justice SWINFEN EADY: Where you are supplying power, is it more profitable to the station to add light?

Mr. COLEFAX said the evidence was all the other way. The moment one supplied light one diminished the load for power. There was no doubt that the power customer was the better one; but *quâ* light he was not the better customer, and therefore he ought not to get any concession. He did not say that large and small consumers should be treated the same; but he did say the defendants were offering persons an inducement to take a different supply. The learned Judge had differentiated, *quâ* customers for light, between the two; and the consequence was that, *quâ* power, the user of power for light would be in a different class to the user for power only, and should be put into an intermediate list. As the case was entirely governed by the principle of the Long Eaton case, he submitted that the judgment of the Court below should be reversed, and the appeal allowed.

Mr. A. J. WALTER, K.C. (with him Mr. SPENCE), for the respondents, said he hoped to satisfy the Court that appellants had based their whole case upon a misconception of the true effect of the sections of the Act. The Act was passed to prevent different charges to different persons; but appellants sought to read the Act as though some differentiation were created between not the consumers but the consumption. An electric supply company supplied only one thing—viz., electric energy; and the only interest it had in the use of the energy was in so far as it affected the cost of supplying this particular energy. Different supplies cost the company different amounts. It was supposed because a light consumer paid a larger price he was a better customer than a power consumer who paid a less price; but the contrary was the fact. An electric light undertaking had a building in which there were engines, dynamos, accumulators, and various other machines which had to be on a scale to meet the maximum demand which at any time might be imposed on the station. This was of fundamental importance in considering the scale of cost. Usually the maximum demand occurred about six o'clock in the evening; and in the case of Hackney, on Jan. 21, 1914, the maximum demand rose to 5254 K.W.—in other words, the station had to be prepared to deal with that energy. In electric light stations expenses were divided between capital charges, interest for sinking fund, and depreciation charges, which were standing charges and went on whether little or much electricity was generated. In this case, the cost was £8 per K.W. per annum as the standing charges, no matter what amount of current was supplied. On the other hand, it was agreed by both parties that the cost of generating units increased as each unit cost 0·348d., and therefore anything one could get above this figure was adding so much to the earning capacity of the station. The maximum load on the station being 5254 K.W., this was represented by the load on all the consumers *plus* a certain amount for loss in the main by heat. The ordinary lighting was only for about two hours a day, measured by the demand of any maximum light user. The charge to him was based on the fact which experience had taught that light users only used about two hours per day of their maximum demand. That was to say, if one depended on light users alone for 22 out of the 24 hours, one's capital expenditure was valueless for the purpose of earning income. Therefore all electric light undertakings tried to extend the useful work of their plant, and for this purpose they endeavoured to procure load supplies of energy at different hours of the day from those at which the light consumers came on. The station did not know what the consumers did with the energy. If a light customer bought for 24 hours at his maximum demand, the undertaking would have a beneficial use of its machinery. Among power users, both individually and collectively, their machines were not all in use at the same time. The maximum demand was so much; but it was found in practice—and this was what diversity factor meant—that, if one took power users as a class, if one had a demand at the station of 1000 K.W. one could supply it with half the plant; and in properly apportioning charges between different classes of customers one could not charge the power user £7 or £8 per K.W. Both on the ground of diversity and longer user of machinery, the power user was entitled to pay a lower price, as he cost the station less. The power *plus* light user was 22 p.ct. compared with the light user, who might be put at 11; and yet the Court was asked to say that a customer who used the plant for 22 p.ct. of the 24 hours could not be charged differently to the man who used the plant for 11 p.ct. of the 24 hours. All the authorities, rightly understood, were absolutely in favour of the respondents. The charges were all based on consideration of the cost of supplying a particular customer. With the exception of the circumstances attaching to each user, enabling them to know how profitable the customer was to them, it was of no importance to the supplier to know what the energy was being used for. The Act of Parliament had nothing to do with light—it merely said the Borough Council were entitled to charge for electrical energy supplied. Appellants were attempting to distinguish between class of consumption instead of classes of consumers; and a false difference was raised between power and light, which were only factors affecting the price a particular customer cost the concern. There was no such distinction known as between power and light for the purpose of the Act. The Long Eaton case, when properly understood, was a direct authority in favour of the contention raised by respondents.

The proceedings were then adjourned.

There is every likelihood of the formation of a Municipal Wages Board for the Calder Valley of Yorkshire, which will include representatives of the many Local Councils.

INCANDESCENT MANTLES CONDEMNED.

In the King's Bench Division of the High Court, last Tuesday, the case of the *Attorney-General v. Hoffman* came before Mr. Justice Darling and a Special Jury.

The ATTORNEY-GENERAL (with him Mr. GIVEEN) said this was a claim by the Crown asking for the forfeiture of five cases of incandescent gas-mantles, valued at £195, imported into Newcastle in December, 1915, by George Jolian Benjamin Hoffman, of Kézergracht, Amsterdam, consigned to the Provincial Incandescent Fittings Company. The Defendant, no doubt exercising a wise discretion, had not thought fit to appear to defend the case. After calling attention to the provisions of sections 5 and 6 of the Customs (War Power) Act, 1915, to the effect that, where the Commissioners were satisfied that the country of origin of the goods was an enemy country, they might order the seizure of the goods (and it was to be presumed that the country of origin was an enemy country unless the contrary was proved), Counsel said the mantles in question were of German origin, though they were disguised as Dutch. They were inverted mantles, and did not correspond with the deposited Consular sample. The alleged Dutch manufacturer could not possibly have made them. The boxes in which the mantles were enclosed were also of German origin, and made with German labour and materials.

Evidence having been given of the importation and seizure of the five cases,

Mr. *B. Bark*, the Works Manager of the Welsbach Company, was called, and stated that he had had considerable experience in the manufacture of incandescent mantles, and was acquainted with the characteristics of mantles made in England and in Germany. He had examined the samples produced, and was of opinion that the material and manufacture of the mantles, and the boxes, were of enemy origin. The rings were made in a factory near Berlin; and the stitching of the mantle to the ring was done by a Cohn machine. The yarn was made in Germany. The Consular sample did not, in every respect, correspond with the other samples, being hand sewn, and not machined; and the rings were also different. The Consular sample was not made in England or in Germany.

His LORDSHIP asked whether this sample had been faked, in order to pass the Consul.

Witness said that was his opinion.

The Jury found in favour of the Crown, and judgment was given for condemnation.

Enemy Coal-Tar Patents.

In the Patents Court last Wednesday, application was made by Messrs. Brotherton and Co., Ltd., of City Chambers, Leeds, for licence to use four alien patents for the production of drugs and fabric dyes in khaki and indigo blue. The patents are No. 8816 of 1915, for hydrosulphite of soda; No. 7592 of 1905, and No. 13,599 of 1904, for Rongalite and Decroline; and No. 10,716 of 1915, for chrome olive B. The applicants had purchased for £200,000 the Mersey Chemical Works (originally an alien concern) at Bromborough, Birkenhead. The works had lately been under a Board of Trade Controller; and these patents belonged to the 600 made over to the firm by the Badische Anilin und Soda Fabrik. Messrs. Brotherton and Co., Ltd., were a firm of the most solid financial standing. Some of the patents were wanted for the Yorkshire and other dyeing areas. The second and third patents, though extensively used for dyeing purposes, were in great demand for drugs, such as salvarsan; and nobody appeared able to manufacture them but the applicants. Dr. Ehrhurdt, the Chief Chemist at the works, said nobody but themselves could produce solid hydrosulphite. For the plant and buildings alone, Messrs. Brotherton paid £135,000. The Controller of Patents notified that the Board of Trade would be recommended to issue the licences asked for, and no time would be lost. They would be made retrospective in date.

War Conditions and Contracts.

Judgment was given last week by the House of Lords in the long litigation between the Metropolitan Water Board and Messrs. Dick, Kerr, & Co., Ltd., the point to be decided in which was whether contracts for the construction of a reservoir at Littleton were still in existence as binding contracts, or had been determined by reason of the exercise by the Ministry of Munitions of the suspensory powers conferred on them by the Defence of the Realm Act and Regulations. Messrs. Dick, Kerr, & Co. received a letter from the Ministry of Munitions requiring them to cease work, and to place their plant and labour at the disposal of the Ministry, with a view to increasing the production of munitions elsewhere. At the date of the stoppage, plant had been installed to the value of over £90,000, and the total expenditure amounted to £178,577, in respect of which certificates had been given by the Engineer to the total amount of £40,310 only on account of permanent works. Mr. Justice Bray granted a declaration that the contract had not been determined, and that under a clause of the contract all the plant that came upon the site of the works became the property of the Water Board. He granted an injunction restraining the firm from removing any of the plant, tools, or materials on the site. The Court of Appeal decided that the effect of the Order of the Ministry of Munitions was to make it illegal to continue work under the contract, and that each party was entitled to treat the contract as at an end. Against this order the Water Board appealed to the House of Lords, by whom the appeal was unanimously dismissed, with costs.

Dispute at Todmorden.—Trouble has developed at the Todmorden Corporation Gas-Works, owing to some of the men refusing to join the Union, who contend that these men have participated in advances of wages obtained by the efforts of the organization. The Union men have given notice of stoppage of work unless the men concerned join them.

MISCELLANEOUS NEWS.

LOCAL AUTHORITIES AND GAS UNDERTAKINGS.

Combining for Opposition.

In a circular to local authorities, the Islington Borough Council have forwarded a print of the report of the Public Control Committee of the London County Council on the subject of proposals, at a recent conference of representatives of gas undertakings, to secure relief from the financial hardships devolving upon such undertakings by reason of the war. The Parliamentary Committee of the Islington Borough Council express the opinion that there is no justification for a proposed modification, in the interest of shareholders, in the existing sliding-scale arrangement, which will be to the prejudice of consumers, and are of opinion that the proposal should be strenuously resisted. They ask councils to make representations to the Board of Trade upon the subject, and hope the Board will not sanction the proposals which have been made to them in the matter by the gas companies.

In this connection, the local authorities who do not own gas undertakings have established an organization to defend their interests. The organization has been formed as a result of the Orders made by the Board of Trade under the Gas (Standard of Calorific Power) Act, 1916, authorizing the calorific standard in substitution for the illuminating power standard. It will be recalled that in January a conference of local authorities was held in London, when it was urged: (1) That the 500 B.Th.U. which was the standard being fixed by the Board of Trade under all their Orders was hardly sufficient, as it would not give the equivalent to the standard candle power at which the various gas companies were obligated to supply gas to the consumer. (2) That the time—five years—being fixed for the Orders to remain in operation without being subject to review in any way was too long a period, though the authorities realized that the matter was of material importance, as one of the main objects of changing from the illuminating to the calorific standard was to enable gas companies to extract benzol and toluol from the gas for the purposes of munitions. The authorities suggested that the various Orders should be limited to the period of the war and one year afterwards; but the Board of Trade have made all Orders for the five-year period. Nevertheless, there was still much dissatisfaction on the part of local authorities; and some of them opposed the application of the gas companies for Orders. The Swansea Corporation suggested that the Board of Trade should hold a Departmental inquiry into the question of inert constituents; and the result has been that the Fuel Research Board have been asked to make such an investigation, and to advise as to what is the most suitable composition and quality of gas, and the minimum pressure at which it should be supplied, having regard to the desirability of economy in the use of coal, the adequate recovery of bye-products, and the purposes for which gas is now used. The Fuel Research Board have already received the views of several bodies on the matter.

The local authorities have held another conference in London, when Alderman Merrells (Swansea) presided, and representatives were present from Brighton, Chester, Croydon, Hastings, Hull, Leamington, Llandaff and Dinas Powis, Newcastle-on-Tyne, Northampton, Richmond (Surrey), Scarborough, Swansea, Tunbridge Wells, Tynemouth, Wakefield, and Worthing. In a report to the conference Mr. Lang Coath (the Town Clerk of Swansea) showed that since the January conference developments had taken place in regard to Orders which the Board of Trade had been granting from time to time authorizing gas companies to substitute the calorific standard for the illuminating standard. The question of inert constituents which had in many instances been found in gas arose on the opposition to the Swansea Gas Company's Orders. As a result, an inquiry had been determined upon; and it was thought that local authorities should place their views before the Fuel Research Board. There was now a proposal in regard to the standard maximum price of gas being revised. He accordingly suggested that, if the conference thought representation should be made to the Fuel Research Board, the following points should be dealt with:

(1) That gas should be supplied at a calorific standard not less than 500 B.Th.U.
(2) That there should be a pressure of 2 in. at least.
(3) That no gas should contain inert constituents to a greater extent than 10 p.ct., and that penalties should be fixed for any excess above that amount.
(4) That the gas companies should provide proper testing-places at suitable sites and distances away from the works.
(5) That as to raising the standard of the price of gas, representation should be made to the Board of Trade or to Parliament, to hear the views of the authorities who do not own gas undertakings before sanctioning the raising of the standard price of gas in any areas generally.

On the motion of the Town Clerk of Tynemouth, seconded by the Mayor of Scarborough, it was resolved:

(1) That the local authorities not owning gas undertakings form themselves into an Association to advance and safeguard their interests, and of those they represent, in all matters appertaining to gas supplies, and upon the changes now taking place in connection therewith, and upon any proposals to raise the price of gas; and in connection with these purposes, among other things, to make such representations as may be necessary to the Board of Trade and the Fuel Research Board upon the important matters these bodies are now dealing with; and that the expenses incurred in giving effect to this resolution be borne by the authorities in proportion to their rateable value.
(2) That Mr. H. Lang-Coath, the Town Clerk of Swansea, be invited to act as Hon. Secretary to the Association.
(3) That representatives of the following municipalities be appointed a Committee to take all such steps as they may deem necessary to present the Association's case to the Board of Trade and the Fuel Research Board, and to deal with any proposals which may be before the Board of Trade or Parliament in regard to increasing the standard price of gas: Brighton, Hastings, Hull, Liverpool, Newcastle, Northampton, Swansea, Tynemouth, and Wakefield.

SUPPLY OF GAS TO ROAD VEHICLES.

A discussion on the supply of power or fuel to road vehicles took place at a meeting of the Institution of County and Municipal Engineers on Friday last.

Mr. J. A. BRODIE, the Borough Engineer and Surveyor of Liverpool, who opened the discussion, said that his department had about forty motors; and gasbags had been applied to the lighter vehicles. In view of the possibility of petrol being kept more strictly for military purposes in the future, he had advised his Council to provide a plant for compressing gas up to 2000 lbs. per sq. inch. This was now being put down at a depôt; and when the difficulties with regard to petrol became sufficiently great, the plant would be made use of, and gas used exclusively for the motors. He anticipated that the cost of the plant would be saved in a very short time, owing to the economy of using gas. Arrangements had been made for taking the gas supply at six or seven stations in streets which were not main traffic thoroughfares. Overhead pipes were used, and were swung out over the footway in order not to inconvenience foot passengers.

Mr. H. E. STILGOE, the City Engineer of Birmingham, urged local authorities not to hamper industry by unnecessary restrictions as to charging stations. In Birmingham there were different types of gas-charging stations. The street type consisted of a valve-controlled standpost, fixed near the edge of the footpath, and a small office for the attendant. In the office was a clock-driven pressure regulator showing upon a chart, in a revolving drum, the tenths of an inch for the gas pressure, the time each filling was made, the time occupied, and the number of fills during the twenty-four hours. The pressure in the gas-main usually varied between 30-10ths and 40-10ths. At the top of the standpost was fitted a 2-in. pipe closed by a screw cam. The connection to the inlet of the gas-bag was by means of a rubber pipe with a metal nozzle. A charge of 250 c.ft. was taken in five minutes. There was no meter on this type of station. If a meter was provided, the charge pipe should be 4-in. diameter, to give greater speed in filling. The charging stations at the gas-works were usually provided with meters capable of passing 3000 c.ft. of gas per hour; the outlet pipe being 4 in. The gas-bags were calibrated on the occasion of their first filling, and the capacity stencilled on; so that afterwards they could be charged at non-meter stations. Some of the omnibuses in Birmingham were fitted with bags of 700 c.ft. capacity. They were made of the best balloon material and cost £50 each. On an average, a bus carrying 35 passengers ran a mile on 60 c.ft. of gas at ordinary pressure. The Birmingham charges were: For bags up to 250 c.ft. capacity, 1s.; 300 c.ft., 1s. 3d.; 350 c.ft., 1s. 6d.; 425 c.ft., 1s. 8d.; and 500 c.ft., 2s. —the minimum charge being 1s. The local bus manager had told him that the buses were running quite satisfactorily on gas.

Mr. H. T. CHAPMAN, the County Surveyor of Kent, expressed the view that the provision of charging stations for vehicles using gas was a most pressing question. Although 370 miles of main roads in Kent had bus services, in many parts there were no facilities for supplying gas. He foresaw, however, that the provision of such facilities by the roadside would lead to the necessity for widening roads in order to provide a stand for the vehicles, otherwise there would be obstruction to other vehicles. He suggested the provision of draw-off places 36 ft. long and (say) 7 ft. 6 in. in width. If there were frequent services of buses, however, the length would have to be increased.

Mr. H. T. WAKELAM, the County Surveyor of Middlesex, thought it was only intended to substitute gas for petrol during the war. The subject was specially important in the Metropolitan police area. No power was given to gas undertakings to supply gas for use outside their area; and those who supplied the buses running into London from the coast were apparently acting illegally. He was not, however, opposed to the proposal, and would prefer to see the supply of gas for this purpose unhampered.

Mr. COOPER (Wimbledon) said it would be a simple thing to get a clause passed to amend the Gas Acts in respect of the point raised by the last speaker. With regard to the comparative price of gas and petrol, the latter had always paid a fairly good tax; and if this tax was transferred to gas when used for traction purposes, the prices mentioned would be higher.

Mr. W. N. BLAIR, the Borough Surveyor of St. Pancras, said that, having regard to the thousands of vehicles that might require to take supplies of gas in the principal streets of London, charging stations should not be permitted in first-class thoroughfares. Suitable points would have to be selected in the by-streets. Even then the frontagers might object to vehicles standing outside their premises.

Mr. O. E. WINTER, the Borough Surveyor of Hampstead, said the Metropolitan Boroughs Standing Joint Committee had recently passed resolutions recommending that each borough council should have the right to veto any installation within its area, that installations should only be set up in such positions as might be settled by the borough council concerned, that if permission were given there should be provision for a payment to be made by the vehicle owners, and that the Council should have the power to determine the agreement in the event of a breach of any of its terms.

Mr. J. SUTCLIFFE, the Borough Engineer of Woolwich, said the resolutions of the London Boroughs Standing Joint Committee had not exhibited a progressive spirit towards this question. The suggestion that the local council should have a veto was ridiculous.

Mr. E. WILLIS, the Borough Surveyor of Chiswick, agreed that borough councils must be constructive bodies in this matter. At Chiswick, a site had been selected on condition that a lay-by was provided. The gas company would not bear the expense; but a charging station had been provided within two miles of the point originally selected.

Mr. F. P. DOLAMORE, the Borough Surveyor of Bournemouth, said three stations had been erected by the Bournemouth Gas Company; but a fourth had been objected to by the Corporation. The Company got over the difficulty by supplying gas to vehicles through a gantry over their show-rooms in the main road.

Mr. E. E. SPURRELL, the Borough Surveyor of Holborn, said that as the gas industry was represented on the Gas Traction Committee, the Institution should also be represented. His Council were in favour of the local veto; but all applications for the erection of standards for charging would be considered on their merits.

Mr. C. M. BROWNRIDGE, the Borough Engineer of Birkenhead, submitted the following resolution:

That, provided the interests of the public regarding the user of highways is properly safeguarded, it is desirable that every effort should be made to assist users of mechanical vehicles by giving reasonable facilities for the re-charging or supplying of their vehicles with power, fuel, or stores.

That before any pipe, hydrant, plug, or other appliance is fixed in, or over, a street or highway, the consent of the local highway authority shall be first obtained.

That pipes, hydrants, plugs, or other appliances for the supplying of power, fuel, or stores for mechanically propelled vehicles shall not, unless absolutely unavoidable, be placed on, in, or over any main highway, but shall be placed in side streets or roads where waiting vehicles and appliances for furnishing supplies will not cause any obstruction or inconvenience to the public.

The resolution was referred to the Roads Committee for report.

Mr. BRODIE, replying to the discussion, said he was not sure that gas traction would disappear when the war was over. There would be difficulties with regard to petrol for a number of years; and they should proceed at once to make arrangements for compressing gas.

QUALITY OF GAS IN THE TOTTENHAM AREA.

Board of Trade Inquiry Demanded.

The attitude of some of the Local Authorities in the large area covered by the Tottenham District Light, Heat, and Power Company in respect of the quantity and quality of gas supplied is, to say the least, unsympathetic, which indicates the fact that the very difficult position of the Company is not properly appreciated. As stated in last week's "JOURNAL," the Tottenham District Council had been in communication with the Company on the subject, and demanded the definite assurance that steps would be taken without delay to remedy the existing unsatisfactory state of affairs. The Company, in reply, stated that they had spent a huge amount on a new section of plant, which, but for the war, would have been completed in 1915. Other conditions had operated against the Company; and, moreover, the Tottenham District Council had refused to allow a pumping-station to be erected on a public common, to improve the supply—otherwise the present serious position would have been avoided.

Now, the neighbouring district of Wood Green has taken up the attack. At the District Council meeting last Wednesday, the Clerk reported that he had been inundated with complaints about the inferior quality and pressure of the gas, and the high charge made for a commodity, which was almost useless in its present form. There was a letter from the Company regretting the trouble, and hoping for an improvement when the new plant, now installed, was brought into use. After the Chairman and one of the members had made some strong remarks, it was agreed to immediately ask the Board of Trade to hold an inquiry into the matter.

The local Press, while realizing the very great inconvenience to which the public is subjected, defend the Company on the ground that everything possible is being done to improve the prevailing state of things. It is rightly urged that while, for the purposes of the war, the Government require the Company to extract certain valuable properties from the gas, it is quite impossible to provide the normal supply. "Nobody," writes the local correspondent of the "JOURNAL," "would be more anxious for Board of Trade intervention than the Company, if it would mean a satisfactory solution of the difficulty. Is it to be expected for a moment that the Company welcome what I have seen to-day—the laying of electric light cables into business premises where gas has been used previously? It is exasperating that the light is so poor; but there is a war on, and the sooner local authorities are made to realize this the better."

NOTTINGHAM GAS-WORKERS' WAGES.

Further considerable calls upon the finances of the Nottingham Corporation Gas Committee are involved by the decision of the Government Committee on Production. There has been a general application upon the part of the municipal employees for an augmentation of pre-war rates supplementing bonuses already conceded, and, in the case of gas workers, extra emolument derived through a judgment for which Sir Geo. Askwith was responsible.

The estimate originally was that, if increases were made to the full extent suggested, an enormous extra demand would be imposed upon the city's exchequer, totalling, in all branches of the service, to at least £60,000 a year—one computation placing it at £20,000 beyond this sum. Having heard evidence in London, the Commissioners have now awarded advances which will aggregate £20,000 annually. As a municipal rate of 1d. in the pound brings in approximately £4500 upon the present assessable value of property in the city, it follows that there is a certainty of a formidable increase in local burdens unless recourse, among other remedies, is had to the further annexation of gas profits. The cases of the lower-paid hands meet with sympathetic

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acceptance in connection with the local award; but this consideration becomes considerably modified when the rates of remuneration of other sections of workers are examined in detail. Of the £20,000 indicated, naturally the heaviest proportion bears relation to the employees of the gas undertaking, as the largest municipal trading concern.

GAS CONSUMPTION IN GERMANY.

In continuation of the statistics given in the "JOURNAL" for July 3 last [p. 38] at to the production of gas by over 700 German gas undertakings, there are given below the figures showing the increases and decreases which the months of February to July last show over the corresponding months of previous years. The figures have been collected by the Central Gas Publicity Bureau, which has its headquarters in Berlin, and have been published in the "Journal für Gasbeleuchtung" for the 3rd ult. and Aug. 18 last.

INCREASES AND DECREASES.

Month.	1917 over 1916.	1916 over 1915.	1916 over 1914.
	P.ct.	P.ct.	P.ct.
February	− 0·004	+ 12·6	+ 6·9
March	+ 8 2	+ 9·8	+ 6·2
April	+ 11·3	+ 10·7	+ 7·5
May	+ 25·3	+ 5·5	+ 3·4
June	+ 26·5	+ 1·2	+ 3·4
July.	+ 24·9	+ 1·4	+ 5·1

In April last, the number of ordinary meters supplied by about 500 German gas-works was 5·3 p.ct. higher than in April, 1916, and of prepayment meters 9·7 p.ct. higher. In July last, the increase of ordinary meters was 5·2 p.ct. over July, 1916, and 12·5 p.ct. over July, 1915; and the increase of prepayment meters was 9·5 p.ct. over July, 1916, and 23·5 p.ct. over July, 1915.

The increase in the number of gas consumers and the difficulty of obtaining supplies of coal are the factors chiefly responsible for the increased consumption shown in the foregoing table. The Government Order restricting gas consumption in Germany by ordinary consumers had not come into force during the months covered by these statistics.

The Royal Humane Society's certificate for life saving has been presented to Mr. Leeming Varley, who is on the staff of the Skipton Urban District Council Gas-Works. Mr. Varley has been the means of saving the lives of several persons from drowning.

SOUTH METROPOLITAN GAS COMPANY AND THEIR LAMP ATTENDANTS.

Patriotic Action Acknowledged.

At the Camberwell Tribunal, the South Metropolitan Gas Company appeared to show cause, at the request of the National Service Representative, why 34 certificates of conditional exemption should not be withdrawn which had been granted to public street-lamp attendants.

Mr. ALBERT STOKES, who represented the Company, stated that the men now held certificates, under the Protected Trades Schedule, from the Munition Area Recruiting Officer. The Company had been able to train substitutes to take the places of these men, so that, so far as the Company were concerned, they were now available for the army. They were not lamplighters in the ordinary meaning of the word, for the men were engaged on repairs. In a sense, they were tinsmiths, and thus came under the schedule of the protected trades.

The TOWN CLERK inquired whether, in the event of the certificates being withdrawn, the men could go elsewhere to work?

Mr. STOKES replied that they could not, but would have to join-up. If they retained their certificates, they could leave the Company and get work elsewhere.

The TOWN CLERK said that, if the certificates were withdrawn, the men retained the right to lodge appeals with the Tribunal on domestic grounds. It was not right, now the Company were prepared to release the men, that they should be permitted to hold the certificates, and get work in another district.

Sir EVAN SPICER said he agreed; but, at the same time, the thanks of the Tribunal were due to the South Metropolitan Gas Company for their patriotic action, not only in releasing these men, but for their attitude since the outbreak of the war. He proposed that the Tribunal tender their thanks to the Company.

The CHAIRMAN (Alderman Maloney) said he agreed fully with what Sir Evan Spicer had said. The Company had done their duty all through.

The NATIONAL SERVICE REPRESENTATIVE (Mr. G. R. Helmore) said he must join in the vote of thanks to the Company for the able assistance they had given him.

Mr. STOKES said he would convey the resolution to his Directors. He hoped in the not very distant future they might be able to release a few more men.

The TOWN CLERK added that it was not fair to the Company that, after training women to do this work so that they might release these men, the men could now leave the Company and go to other firms who had not been patriotic enough to train women to work.

The conditional exemption certificates were then withdrawn; and the National Service Representative undertook to communicate with the Munition Area Recruiting Officer, with a view to the certificates under the Protected Trades Schedule being also withdrawn.

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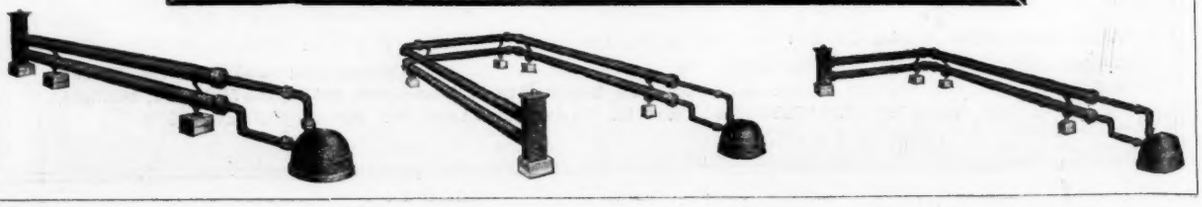

GAS FOR MOTOR VEHICLES.

It is understood, says "The Times," that the Government Departments concerned are considering the situation which has arisen from the substitution of gas for petrol in vehicles which the Petrol Committee have refused to licence. Numbers of cars, the running of which is regarded as unnecessary, are now in the hands of motor manufacturers for conversion into gas-driven vehicles. One large firm is said to have work of this kind on its books to last for two years. As the men engaged on the work of conversion are of a class whose services are urgently required for essential war work, it is highly probable that the use of gas as a propellant will be forbidden to the owners of all cars to whom a petrol licence has been refused.

Interviewed by the "Evening Standard" on the subject of the above announcement, Mr. F. G. Bristow (the Secretary of the Commercial Motor Users' Association) stated, as the reasons why the course indicated had been urged, that: "First, if a man has any legitimate reason for using a car at all, he can get a petrol licence. Then the fact that firms are taking orders for private people for gas-bags means that a large number of commercial cars which require these bags for transport purposes have to wait several weeks before they can be so converted. The third point is that in the winter months the various gas companies have what they call a 'full load.' In other words, so much more gas is wanted in winter for heating and cooking that the companies are working practically to the limit of their capacity, and are prepared to supply gas facilities only to commercial motors."

Where a local authority run their own gas-works there is, says "Motor Traction," both inducement and necessity for them to advertise their facilities for motor transport. The most obvious way is to adapt a light delivery van; and this has widely been done. But in quite a number of cases the demonstration ends there; and with only one van equipped for gas out of a considerable fleet, the authority lay themselves open to the charge of not practising what they preach. Municipal undertakings are in a somewhat favoured position as regards petrol supplies; and this may account for such anomalies as that just described. Nevertheless, it must also be urged, they are, with some reservations, better able to carry on their work with gas than are many private traders. Both their total mileage and the area of operation are, as a rule, on the small side; and these are precisely the conditions in which "war fuel" may be used to the maximum advantage. It therefore follows that, despite the preference they have with spirit supplies, municipal authorities, whether they own gas undertakings or not, should utilize gas to the utmost, and thus set free petrol for use in other directions in which it is more essential.

Recording the fact that army lorries are now running on coal gas in London, "Motor Cycling" says it will be interesting to see if the motor-cycles and side-cars are also converted, as there is no doubt that a very large saving could be effected in this respect, especially when several motor-cycles and side-cars are used in London for short distances with small parcels.

The Belfast Corporation, it is reported, in order to encourage the wide utilization of gas for motor vehicles, are granting supplies at the power rate, instead of at the lighting tariff.

A gas-container for attachment to a motor lawn mower has been supplied by Messrs. Ernest Lyon Ltd., of New Bond Street, W., for use at Haileybury College.

The names of the members of the Committee which the Government recently decided to establish to consider and report upon the employment of gas in substitution for petrol and petroleum products for traction purposes, will be found on an earlier page of this issue.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Dec.* 3, 1917.

There has been considerable inquiry for pitch during the past week, and the position of the article is well maintained. In other products, there is little movement. Solvent naphtha continues in a strong position. The price is between 4s. 3d. and 4s. 6d. per gallon net in bulk at makers' works; while the quantity available for delivery over some months ahead is extremely limited.

The demand for sulphate of ammonia continues active, and all available supplies are readily taken up for home agricultural purposes at Government prices.

Tar Products in the Provinces.

Dec. 3.

The average values for gas-works products during the week were: Gas-works coal tar, 26s. 9d. to 30s. 9d. Pitch, East Coast 20s. to 25s. per ton; West Coast—Manchester 18s. 6d. to 19s. 6d., Liverpool 19s. 6d. to 20s. 6d., Clyde 19s. 6d. to 20s. 6d. nominal. Benzol 90 p.ct., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 7¾d. to 8¼d. Solvent naphtha, naked, North, 3s. 6d. to 3s. 8d. Heavy naphtha, North, 1s. 8d. to 1s. 10d. Creosote, in bulk, North 3¾d. to 4¼d. Heavy oils, in bulk, North 4¼d. to 4½d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s. to 90s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Manchester District Tar Prices.

The average price realized for tar in this district, based on the value of the products for the month of October, was 30s. 4½d. per ton.

IMPORTANT ANNOUNCEMENT!

MESSRS.

R. & J. DEMPSTER, Ltd.,

having found it necessary to make alterations in their London Office, desire to announce they have now installed a

TECHNICAL STAFF in NEW OFFICES at

CONNAUGHT MANSIONS,
34, VICTORIA STREET,
WESTMINSTER, S.W. 1.

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This alteration will enable them to give prompt attention to all Government and Gas Trade enquiries, and they hope it will prove serviceable to old and new clients.

GAS PLANT WORKS, MANCHESTER.

FROM A MARKET CORRESPONDENT.

Tar Products.

Conditions have undergone very little change since the last report; the good tone then noted having been maintained. Solvent naphtha continues in fair demand at 4s. 6d. per gallon for prompt delivery; and orders are being booked for delivery over the first six months of next year at slightly under this figure. The nature of the buying and the condition of supplies suggest that a higher price may yet be witnessed, although at the time of writing there are whispers that the Government intend to issue a price-fixing order on this product at an early date. Heavy naphtha remains a strong feature at 3s. per gallon. A good trade is being done in naphthalenes at late rates. Export licences are readily available for refined, which makes from £30 to £35; but the licence system, however generously it may be interpreted, causes much irritation and delay, and is an undoubted hindrance to increased business. Crudes are selling well at from £5 10s. to £15; lower grades being especially sought after. Cresylic acid is firm with an improving tendency; but aniline oil is still on the dull side. There is nothing fresh in benzols and carbolic acid; official requirements absorbing practically the whole supply. The same remark applies to creosote. London pitch is firm at 48s. per ton f.o.b., and up to 50s. is asked for prompt. The Provincial position still has an improving tendency, in spite of the increased accumulations which are usual as winter approaches. The reason for this is not so much the present outgoing of pitch as the hope of improved shipping facilities to enable Provincial makers to obtain a greater share of the export business, and of the early solution of difficulties which have arisen in connection with blending with fuel oil. The latter especially should lead to a substantial increase in consumption, and traders are consequently encouraged to hold out for better prices. The range of quotations is as follows:

Aniline Oil (pure): 1s. 2d. per lb.

Benzol: 90% London, 1s. 0½d., North 10½d. to 11½d.; 50% North 1s. 4d. to 1s. 5d. naked per gallon.

Carbolic Acid: 60% East and West Coast 3s. 6d. per gallon; crystals 40% 1s. 3d. per lb.

Crude Tar: London 28s. to 32s., Midlands 25s. to 26s.; North 26s. per ton, *ex* works.

Pitch: London 48s. to 50s. f.o.b.; East Coast, 23s. to 26s. f.o.b.; West Coast—Liverpool 22s.; Manchester 22s. to 23s. f.a.s., Clyde 22s. to 24s.

Solvent Naphtha: Naked London 90-190% 3s. to 3s. 3d.; North 2s. 9d. to 3s. per gallon; 90-160% naked London 4s. 3d. to 4s. 6d.; North 4s. to 4s. 3d. per gallon.

Crude Naphtha: Naked 30% 8¼d. to 8½d.; North 6¼d. to 6½d.

Naphthalene: Refined £32 10s. to £35; salts 80s., bags included.

Toluol: Naked, London 2s. 4d.; North 2s. 3d.

Creosote: Nominal, London 4¼d.; North 3¾d.; heavy oil, 4½d. per gallon in bulk.

Anthracene: "A" quality, 40-45%, 4½d. per unit; "B" quality, 1¾d. to 2¼d.

Cresylic Acid: 95%, 2s. 7d.; 97-99%, 2s. 8d. to 2s. 9d. *ex* works London and f.o.b. other ports.

Grease Oils 18° Tw. (naked) £6 per ton f.o.r. makers' works.

Sulphate of Ammonia.

Farmers are being urged officially, in their own interests and in those of the nation generally, to avail themselves without delay of the present opportunity of obtaining supplies of sulphate of ammonia for spring use. Plants are working to their utmost capacity, and many makers are booked with orders to the end of the year. In some districts. deliveries are in arrear; and it is also reported that no further supplies are available this side of the New Year. Orders for the new quarter are being received in satisfactory numbers; and it is now practically certain that the entire output will be required for home agricultural and munition purposes. Consequently, the export trade is likely to come to a standstill until well on into next year. Much of interest to manufacturers of sulphate is to be found in the interim report of the Nitrogen Products Committee which has just been issued. The report recommends, *inter alia*, the erection of a factory with an annual output of 50,000 tons of cyanamide for utilization as such for agriculture or for the production of ammonia, and the erection of a full-sized trial unit plant for the synthetic ammonia process. As regards the latter, the Ministry of Munitions has authorized the erection of such a unit, and already a preliminary semi-technical unit apparatus is at work. It is of further interest to record that the United States Government have granted a sum of over £750,000 for the erection of plant for the synthetic production of ammonia. The process to be adopted has been proved under working conditions, and the costs of production do not differ materially from those put forward for the Haber process. These developments, both at home and abroad, are of considerable importance, and should be closely followed by manufacturers of sulphate in view of their direct bearing upon the future position of the trade. In America, trade is pursuing the course anticipated in these notes. Production has now practically overtaken demand, and fair quantities of "free" sulphate are available. Quotations show a tendency to come down to a lower level, and one or two orders, which were unable to be executed in this country on account of licences being refused, have met with supplies in America.

The charge for gas in Pudsey, Farsley, and the part of the City of Bradford supplied by the Pudsey Company has been advanced from 2s. 5d. to 2s. 11d. per 1000 c.ft.

A decision has been come to by the Stoke-on-Trent Town Council to increase the price of gas from Jan. 1 by 5d. per 1000 c.ft. The increase is rendered necessary by the rise in the cost of coal and labour, and in the cost of cartage. This amounts to over £15,000 per annum.

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SAWER & PURVES

(BRANCH OF METERS LTD.)

Nelson Meter Works, MANCHESTER.

Radford Meter Works, NOTTINGHAM.

Messrs. C. & W. Walker, Ltd.

At an extraordinary meeting of Messrs. C. & W. Walker, Ltd., held in Birmingham last week, a resolution was unanimously carried, to add to the articles so as to enable the sum of £33,320, forming part of the undistributed profits and reserve funds of the Company, to be capitalized by the distribution among the holders of the 49,980 ordinary shares which have been issued, who shall be registered at the closing of the share register on Dec. 31 of this year. The distribution will be at the rate of two new ordinary shares for every three ordinary shares held by them. In proposing the resolution, the Chairman (Mr. J. F. Wright) pointed out that the Directors had always exercised a conservative policy with regard to the finances of the Company. In the early days, they utilized a large part of their profits to pay off £30,000 of debentures which then existed, and also in getting rid of the item of goodwill, which stood at from £25,000 to £30,000. Since then, while maintaining for many years a steady dividend of 15 p.ct., free of income-tax, on the ordinary shares, they had built up a reserve fund which stood at £50,000 on the balance-sheet. Besides this, they had carried forward £11,000; and they had internal reserves which did not appear on the balance-sheet. The principal reason for the distribution of these bonus shares was that the issued capital of the Company would be made to correspond more closely than was at present the case with the actual capital employed in the business.

Wages and Salaries at Dundee.

Various Committees of the Dundee Town Council have been busy discussing the question of the cost of living, as bearing on wages and salaries paid. The Gas Committee had a letter before them from the General Workers' Union, asking for an extra 1d. per hour for men loading coal at the store. The Engineer (Mr. Alex. Yuill) explained that since this letter was received he had learned that Glasgow gave an extra ½d. for similar work; and he would not object to this, as there was a good deal of dust and it was heavy work. The suggestion was agreed to. The Engineer recommended increases of salary to three members of the staff—Superintendent of the tar distillation works, from £287 10s. to £300; residual products salesman, from £253 to £287 10s.; and a clerk, from £124 to £135. Mr. Fletcher moved that no increase be given, in view of the fact that these officials came under the recent bonus of 15 p.ct. The Engineer explained that he was trying to bring up the salaries to the level of those of corresponding officials in other departments. Bailie Kinmond pointed out that they had no sooner reached what they thought to be a settlement, than they got this application. The whole thing would be in the melting-pot again. With the best feelings towards these men, they could not do it. Bailie Noble supported the proposed increases, and pointed out that in ten years the income from coke had increased 142 p.ct., the revenue from sulphate of ammonia 49 p.ct., the revenue from tar 247 p.ct., and the revenue from gas 45 p.ct. Treasurer Robertson remarked that prices had gone up without any extra work. The proposed increases were agreed to.

Continental Union Gas Company, Ltd.

In their report for the financial year ended June 30, which will be submitted at the meeting next Monday, the Directors state that the continuance of war conditions, involving abnormal freights and coal costs, has had a further prejudicial effect on the Continental gas industries (especially in Italy), which, in normal times, constitute the main source of the revenues of the Company; and no dividends have been received from abroad—the payment of the final dividend declared by the Cie. l'Union des Gaz in 1914, amounting to £29,967, being postponed indefinitely. Last year the Directors transferred 26,958 to a foreign dividends suspense account in respect of this amount, which has now been eliminated from the balance-sheet by the transfer of a further sum of £3008 from the credit of the profit and loss account for the year. The credits to this account, with the exception of a rebate of income-tax, are, for the present, derived exclusively from the Company's minor interests, which represent only a small part of its capital. After making the aforesaid provision, there remains a balance of £2046 to the credit of the profit and loss account, which it is proposed to carry forward. The Directors regret to report the retirement, owing to ill health, of the Secretary, Mr. William Martin, who has served the Company faithfully, and with marked ability, for 51 years. The Company will still enjoy the benefit of his long and unique experience—especially in connection with their Continental interests—in a consultative capacity. Mr. Edwin C. Bode, who has been in the service of the Company for many years, has been appointed Secretary.

It should be added that the Union des Gaz have not as yet issued their report.

Athlone Gas Supply.—Great confusion and inconvenience arose in Athlone last week, owing to the sudden failure of the gas supply. The occurrence took place about 9.30 on Monday evening, while many business houses were still open, and during the progress of two or three public entertainments. The explanation given of the failure was insufficient storage. Of three holders attached to the gas-works, two are out of order; and the third is not sufficient for winter-night requirements. The Urban Council had arranged with a cross-Channel firm for the sheeting of the defective holders; but delay arose owing to the restrictions imposed by the Ministry of Munitions. During last week, however, the plates required came to hand; and it is hoped to complete the work forthwith. A restricted gas service on a second night last week caused some apprehension; but the gas-works officials say they do not anticipate further trouble. The town water supply is pumped by gas-engines; and a failure of the gas supply for any length of time might prove serious in that regard—especially as the water supply extends to the military. Athlone is one of the most important of the Irish army centres.

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of advantage from the many found in our Slot Meters are:

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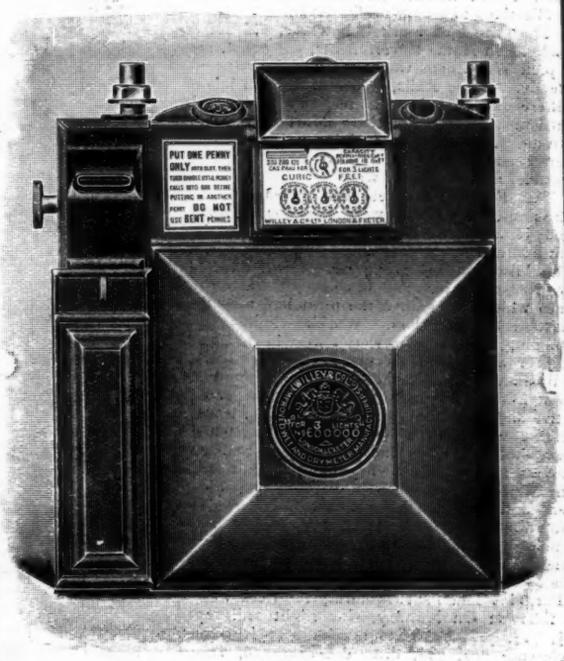

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Lurgan Gas Price.—In the absence of a quorum, the Lurgan Town Council could not last week seal their memorial to the Irish Local Government Board for an amendment, by Provisional Order, of the Local Act of 1915, to enable the maximum price for gas to be increased from 4s. 6d. to 6s. 6d. per 1000 c.ft. A further special meeting is being called.

Revision of Discounts at Spenborough.—The 2s. 6d. per ton increase on coal will cost the Spenborough gas undertaking £1500 per annum; and the Committee, therefore, have advanced gas charges, as from Jan. 1, by lowering the existing discounts by 5 p.ct. to ordinary and power consumers, and by the return of only ½d., instead of 1d., in the shilling, to slot consumers. This advances the cost of gas by an average of slightly less than 1¾d. per 1000 c.ft.

Belfast Gas Prices.—It is proposed that the increase in the price of gas in Belfast—from 2s. 11d. per 1000 c.ft., less 20 p.ct. discount for early payment, to 3s. 6d., less the same discount, with an advance for gas for power from 2s. 6d. to 3s. 1d. per 1000 c.ft.—shall take effect on Jan. 1; and it is calculated that the additional revenue produced will be £16,000. The estimated deficit at the end of the next financial year (March 31) is £18,000, due (as already indicated) to coal prices and wages advances. The new price for lighting represents 1s. advance on pre-war rates.

Coal Merchants' Charges.—The majority of the merchants supplying coal to the Metropolitan Water Board have hitherto been charging 1s. 3d. per ton extra—the maximum amount allowed under the Wholesale Coal Prices Order issued by the Board of Trade in September last under the Defence of the Realm Regulations. In view of the fact that the Water Board is a public utility undertaking, Mr. J. W. Restler (the Chief Engineer) made representations to the Coal Controller, who has decided that the Board shall pay to the factors or merchants the same maximum as gas and electricity undertakings—namely, 9d. per ton. The difference between the prices represents a saving of £5000 a year to the Board.

Rescue Parties in London.—The South Metropolitan Gas Company have responded to a request made by the Greenwich Borough Council to form two rescue parties for the purpose of giving prompt assistance in the case of buildings being demolished during air-raids, and to extricate persons pinned beneath the wreckage. These parties will be stationed at the Old Kent Road works, and will comprise nineteen men—including a motor wagon and driver, two foremen, four heavy lifters and men accustomed to the use of tackle, seven fitters, handymen, and labourers, and five trained ambulance men. To one of these parties Dr. Allen is attached. Each rescue party is provided with a complete set of tools and a full kit of first-aid appliances.

STOCK MARKET REPORT.

THE Stock Exchange had a very quiet inanimate time last week, in which there were more dull points than bright ones, though prices did not suffer seriously. The war news did not contain any new brilliant incident to stimulate enthusiasm, and Russia seemed to be sinking still deeper into the mire of anarchy. Then, after recent notable advances, the inevitable realizations to secure profits set in.

The gilt-edged market, however, did not do badly. In Home Governments, the 5 p.ct. and 4 p.ct. War Loans were firm, and Consols were steady. Home Rails, easier at first on labour differences, closed at a recovery upon their settlement. The American Market was not strong. Argentines were doing well in view of better conditions, when news came of fresh trouble, and they gave way.

The Foreign Market was generally dull. Russians, of course, were hopeless. French and Japanese were firm, and Brazilian also until a turn in the Exchange sent them down. The Miscellaneous group were much affected by profit-snatching, and, of course, the favourite lines which had gained the most had now the most scope for loss. Warlike industrials, Shipping, Oils, and Breweries were in this, and Rubber was dull all the time.

Business in the Gas Market showed improvement from every point of view. It was more active and counted a greater aggregate of transactions which were more evenly distributed throughout the lists, and the prices realized showed a general tendency to move upward. The Metropolitan and the Suburban companies were noticeable in this respect. Advances in quotation were made by Continental Union 1 point, Metropolitan of Melbourne 1½, and Oriental 1½. Primitiva preference was ⅛ lower. The Money Market was easy.

Bargains done for cash during the week were as follows: On Monday, Gas Light ordinary 71⅛, 71½, 71⅝, 72, ditto maximum 57⅛, ditto preference 70¾, 71⅛, ditto debenture 56, Imperial Continental 90⅛, 90¾, 91, Primitiva 34s., 36s. 3d., 36s. 9d., ditto preference 57s. 6d., South Metropolitan 75, ditto preference 95½. On Tuesday, Bournemouth 3 p.ct. debenture 52, Barnet debenture 65¼, 65½, Gas Light ordinary 71⅛, 71⅛, 71⅜, 72, 72¼, 72½, ditto maximum 57, 57⅛, ditto preference 70⅛, 71, ditto debenture 56, Imperial Continental 90⅛, 91¾, South Metropolitan debenture 57, Tottenham "B" 71⅛, 71⅜. On Wednesday, Bournemouth 3 p.ct. debenture 52½, Commercial 4 p.ct. 71¾, Gas Light maximum 57⅛, ditto preference 71⅛, ditto debenture 56⅛, Hong Kong 7⅛, 7⅞, Imperial Continental 91, Metropolitan of Melbourne 94⅜, Oriental 105, Primitiva 34s. 6d., 35s. 9d., South Metropolitan 75, ditto preference 95½, Exeter 10 p.ct. 148½, 149, York 50¾, 51½. On Thursday, Commercial 3½ p.ct. 64½, ditto debenture 53¼, 53¾, Gas Light ordinary 71½, 71¾, ditto maximum 57⅛, ditto preference 70⅛, 71, Imperial Continental 91, 91⅛, Metropolitan of Melbourne 93¼, 98¼, Oriental 105, 106, Primitiva 33s. 9d., 34s. 6d., 35s., 35s. 6d., 36s., South Suburban 75⅛, ditto preference 76, ditto debenture 86½. On Friday, British 32¼, 32½, Commercial debenture 53¾, Gas Light ordinary 72, 72⅛, ditto maximum 57⅛, ditto preference 70⅛, Imperial Continental 90, Metropolitan of Melbourne 99¼, Primitiva preference 55s., South Suburban 76, 76½, ditto preference 75½.

The Bank rate is 5 p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share.	When ex-Dividend.	Ante-War Dividend & Bonus. p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	57—62	..
1,551,868	,,	April 8	2½	4¼%	Alliance & Dublin Ord.	59—64	52—57	..
274,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	57—62	..
280,000	5	April 29	7½	3/6	Bombay, Ltd.	5⅞—6⅛	5—5½	..
50,000	10	Feb. 26	16	14%	Bournemouth Gas and Water { 10 p.c. / B 7 p.c. / Pref. 6 p.c. / 4 p.c. Deb.	29—30	23—25	..
388,110	10	,,	7	7%		15—15½	10½—11	..
115,000	10	,,	6	6/-		13½—14	9—9½	..
159,740	—	—	—	4%		..	69—71	..
992,045	Stk.	Feb. 26	14	5½%	Brentford A Consolid.	261—266	79—82	..
734,920	,,	,,	11	4½%	Do. B New	204—209	76—79	..
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	81—86	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91—93	65—67	..
317,380	,,	Feb. 26	11	10%	Brighton & Hove Orig.	208—213	145—150	..
344,200	,,	,,	8	7%	Do. A Ord. Stk.	154—159	98—103	..
580 000	20	Mar. 26	12½	22/6	British	44—45	32—33	32½—32½
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	68—70	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—56	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	3—3½	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	6½—7½	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	79—81	80*
1,513,380	,,	Feb. 12	5/9/4	44/-	Commercial 4 p.c. Stk.	106—108	70—72	71⅜
560 000	,,	,,	5½	40/-	Do. 3½ p.c. do.	103—105	64—66	64½
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	52—54	53½—53¾
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	40—42	..
300,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	61—63	..
276,400	—	—	—	11½%	Croydon B and C 7 p.c..	..	165—175	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5½%	Derby Con. Stk.	123—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,002,180	10	July 29	10	5/0	European, Ltd.	17½—18	10½—11½	..
16,318,430	Stk.	Feb. 10	4/17/4	87/4	Gas Light and Coke { 4 p.c. Ord. / 3½ p.c. max. / 4 p.c. Con. Pref. / 3 p.c. Con. Deb. / 10 p.c. Bonds	98—102	71—73	71½—72⅜
2,600,000	,,	,,	3½	3½%		76—79	56—58	57—57½
4,062,235	,,	,,	4	4%		96—99	70—72	70½—71½
4,674 850	,,	June 11	3	3%		72½—74½	55—57	56—56½
180,000	,,	,,	10	10%		..	..	..
258,740	,,	Mar. 12	5	3½%	Hastings & St. L. 3½ p.c.	87—89	48—53	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16½	7½—8½	7⅞—7⅞
86,600	—	—	—	9%	Hornsey 7 p.c..	..	115—125	..
181,000	Stk.	Mar. 12	7½	7%	Ilford A and C.	151—154	92—97	..
65,780	,,	,,	6½	5½%	Do. B	115—118	72—77	..
65.500	,,	June 26	4	4%	Do. 4 p.c. Deb.	92—94	65—68	..
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	90—93	90—91⅞
1,235,000	,,	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	65—67	..
235,242	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	82—87	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. { A / B	211—213 / 146—148	82½—83½	83½
306,088	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	71—73	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4½—4⅝	3¾—4	..
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	89—100	98½—99½
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	8—8½*	..
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'dCon.	98½—99½	75—76	..
529,705	,,	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—88	61—63	..
55,940	10	Feb. 26	7/14/0	7½	North Middlesex 7 p.c.	14—15	9½—10½	..
800,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	101—105*	105—106
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	2—3	..
60,000	50	Feb. 26	13	12%	Portsea, Island B	128—131	83—88	..
100,000	50	,,	12	11%	Do. C	118—121	78—78	..
60,000	50	,,	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	1⅝—1⅞	33/9—36/9
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4½—5	2½—3	55/- —57/6
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	78—80	..
—	—	—	—	4%	Do. ,, ,, 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	59—64	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref. / 5 p.c. Deb.	10½—11	7½—8	..
125,000	50	July 1	5	5%		47—49	40—42	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	228—234	..	..
209,984	,,	,,	10	10%	Do. B	229—234	180—184	..
523.500	,,	,,	10	10%	Do. C	220—222	..	..
90,000	10	May 28	9	6/-	South African.	10½—11½	9—10	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord.	111—113	75—77	75
—	—	—	—	—	Do. Pref.	..	94—96	95½
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb.	72½—74½	55—57	57
224,820	,,	Feb. 26	8½	7½%	South Shields Con. Stk.	157—159	137—139	..
952,795	,,	,,	6	4⅝%	S'th Suburb'n Ord. 5 p.c.	114—116	75—77	75½—76½
60,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110—112	75—77	75½—76
135,000	—	—	—	4⅝%	Do. West Kent	..	..	..
167,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88	86½
647,740	,,	May 14	5	5%	Southampton Ord.	99—102	75—77	..
120,000	,,	Feb. 12	7½	6¾%	Tottenham { A 5 p.c. / B 3½ p.c. / 4 p.c. Deb.	135—138	92—97	..
782,275	,,	,,	6	4%	District	115—117	70—72	71⅝—71⅞
181,255	,,	June 26	4	4%	Tuscan, Ltd.	87—89	63—65	..
189,380	10	Dec. 30	5	—	Do. 5 p.c. Deb. Red.	5—6	1—2	..
149,900	10	July 1	5	5%	Tynemouth 5 p.c. max..	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Wandsworth, Wimbledon, and Epsom—	106½—109½	89—91	..
89,000	,,	Feb. 26	8½	7½/6	Wandsworth A 5 p.c..	151—156	112—117	..
255,686	,,	,,	6½	5⅞/6	Do. B 3½ p.c.	129—134	97—99	..
168,075	,,	,,	5/17/3	50/9	Do. C 3½ p.c.	110—115	84—89	..
262,900	,,	,,	6½	5⅞/6	Wimbledon 5 p.c.	117—122	85—90	..
92,000	,,	,,	6½	5⅞/6	Epsom 5 p.c.	121—126	93—98	..
82,416	,,	June 26	3	3%	3 p.c. Deb. Stk.	66—69	50—53	..

* Ex Div.

Stokers' Notices at Dalton-in-Furness.—It was reported to the Dalton-in-Furness Urban District Council at last week's meeting that the three stokers at the Askam Gas-Works had applied for a further increase of wages, which the Lighting Committee had refused. The stokers had then tendered notice to terminate their engagements; and this had been accepted. The present annual output of gas at the Askam works is under 6 million c.ft.

Wages of Women Gas-Meter Inspectors.—The Chelmsford Gas Committee have received an application for increased wages from the two female meter inspectors, both of whom have been employed in their present work from the end of November, 1915. Their wages have already been increased from 17s. 6d. to 25s. per week. A further 1s. 6d. per week was granted to them by the Council from July 1 this year, in the form of an allowance towards the upkeep of the bicycles which they provide and use for assisting them in their work. The Committee recommend an increase to 28s. 6d. a week.

Anticipated Loss at Shipley.—When considering Gas Committee minutes last week, the Shipley District Council were informed by Mr. Reynolds that it was anticipated there would be a loss of £6012 at the end of the financial year of the gas undertaking, to which would have to be added a loss on the previous year's working. It was realized that a call would have to be made on the general district rate, and that the deficit could not be made up from the ordinary revenue of the undertaking. They felt they were already charging top price. The fact was the undertaking was over-capitalized; and far too much money was paid in interest and sinking fund.

London County Council and Sliding-Scale Revision.—In reply to a question by Mr. A. L. Leon, J.P., Mr. Percy Gates informed the London County Council that, as Vice-Chairman of the Parliamentary Committee, he was aware of the intention of the Metropolitan Gas Companies to introduce in the next session of Parliament Bills applying for power to alter the sliding-scale arrangements against the consumer. A report would be presented to the Council after the Christmas recess; and he had no doubt the Committee would recommend the Council to petition against the Bills, in order that the Council's views might be placed before Parliament. Mr. Leon urged that it would be grossly unfair to alter the sliding-scale, which enabled the Gas Companies to appear to be paying only 5 p.ct. to their shareholders, while in reality, owing to the "watering" of capital which had taken place, the dividends represented 12½ p.ct.

New Joint-Stock Companies.—Rare Metals, Ltd., has been registered as a private company with a capital of £50,000 in 25,000 preferred ordinary shares of £1 each and 50,000 ordinary shares of 10s. each, to carry on the business of manufacturing, experimental, and general chemists. Monazite Products, Ltd., has been registered as a private company with a capital of £30,000 in £1 shares, to carry on business as winners and manufacturers of monazite sand, refiners and manipulators of mineral sands, rare earths, chemical and coal-tar residues, &c. The first Directors are Sir John P. Hewett, G.C.S.I., Mr. H. P. Smith, Mr. R. P. Sellon, and Mr. G. C. H. Matthey.

Forfar Gas Accounts.—The abstract of accounts of the Forfar Town Council for the year ended May 15, shows that the revenue of the gas undertaking (including £8200 for gas and £2918 for residual products) amounted to £11,540, and the expenditure to £9661, leaving a balance of £1879 to be carried to net revenue account. Added to the sum of £1277 on hand at the beginning of the year, there was a total of £3191; and after deducting interest and all other charges, there was a balance to be carried forward of £579. The amount of coal carbonized during the year was 5278 tons, at an average price per ton, including carriage, of 23s. 1¼d. The make of gas was 59,494,200 c.ft., or an average of 11,468 c.ft. per ton (as compared with 9843 c.ft. in the previous year). The unaccounted-for gas figures at 8·54 p.ct. The price, at 3s. 1d. per 1000 c.ft., is 2d. lower than a year ago.

At the Barrow-in-Furness National Service Tribunal last Wednesday, Mr. Fred Chadderton, the Engineer and Manager of the Barrow Corporation Gas-Works, appealed for five employees. He pointed out that two of them held the M.A.R.O. certificate In regard to the others, the Tribunal gave one conditional exemption, one exemption to Jan. 1, and the third exemption to Feb. 1.

Signor Orlando, the Italian Prime Minister, has replied cordially thanking Sir Richard V. Vassar-Smith (the President of the Federation of British Industries) for the following message dispatched by him: "The Federation of British Industries extends its full sympathy to the Italian army and nation in the present crisis, and pledges its members, whose joint capital represents over two thousand million sterling, and who employ some three million workpeople, to stand unreservedly behind the British and Allied Governments in furnishing to Italy any support which they may deem necessary."

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL"

Appointments, &c., Vacant.

WORKS MANAGER AND ENGINEER. "P.," care of Walker's Advertising Agency, 24, Coleman Street, E.C.

MANAGER AND ENGINEER. No. 6385. Applications by Dec. 16.

ASSISTANT. "P.," care of Walker's Advertising Agency, 24, Coleman Street, E.C.

FOREMEN. "L," care of Walker's Advertising Agency, 24, Coleman Street, E.C.

PRODUCER FOREMAN. "C.," care of Walker's Advertising Agency, 24, Coleman Street, E.C.

ENGINEER FITTER. "J.," care of Walker's Advertising Agency, 24, Coleman Street, E.C.

STOKERS. Nixon's Navigation Offices, Mountain Ash.

SECOND ASSISTANT. Warrington Gas Department, Applications by Dec. 15.

CARBONIZING FOREMEN. No. 6384.

Appointments, &c., Vacant (*continued*).

JUNIOR DRAUGHTSMAN. Hendon Gas-Works, Sunderland.

FITTER Wishaw Gas-Works.

Plant, &c. (Second-Hand) for Sale.

MOUTHPIECES, ASCENSION, ARCH, AND DIP PIPES. HYDRAULIC MAIN, RETORT-HOUSE GOVERNOR Southampton Gas-Works.

Plant, &c. (Second-Hand) Wanted.

WASHER-SCRUBBER. No. 6383.

Yellow Prussiate of Soda Wanted.

No. 6382.

TENDERS FOR

Mantles.

WALTHAMSTOW URBAN DISTRICT COUNCIL. Tenders by Dec. 10.

Tar.

ALDERSHOT GAS, WATER, AND DISTRICT LIGHTING COMPANY. Tenders by Dec. 11.

MORLEY GAS DEPARTMENT. Tenders by Dec. 12.

SHOTLEY BRIDGE AND CONSETT GAS COMPANY. Tenders by Dec. 12.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders to Alter or stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Saturday.

Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

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All Communications, Remittances, &c., to be addressed to
WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT

GAS PURIFICATION & CHEMICAL CO., LD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

"VOLCANIC" FIRE CEMENT.
Resists 4,500° Fahr. Best for Gas-Works.
ANDREW STEPHENSON, Gresham House, Old Broad Street, LONDON, E.C. "Volcanism, London."

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, London, S.E. 1.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—
"BRADDOCK, OLDHAM," and "METRIQUE, LAMB LONDON."

BENZOL PLANTS FOR GAS-WORKS.
BAGLEY, MILLS, & Co., Ltd.,
93, Victoria Street, Westminster, S.W., invite inquiries from all gas-works making 75 million cubic feet and upwards per annum.
See Illustrated Advertisement Feb. 20, p. III. of Centre.

OXIDE OF IRON.
SPENT OXIDE WANTED.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3
Phone: Avenue 6660.

"TORTO" FIRE CEMENT.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6660.

"KLEENOFF," THE COOKER CLEANSER.
Tins for sale to Consumers.
In Bulk for Works Use.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6660.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every Description of GAS APPARATUS, ELEVATING, CONVEYING, and TELPHERAGE PLANTS, also STOKING MACHINERY, ROSE MOUNT IRONWORKS, ELLAND.

BRITISH GAS PURIFYING MATERIAL.

ENGLISH BOG ORE AND NATURAL HYDRATED OXIDE OF IRON.
SPENT OXIDE BOUGHT.

BRITISH GAS PURIFYING MATERIALS CO., LTD.
(W. T. P. CUNNINGHAM, Chief Proprietor and Managing Director.)
13, ARCADIAN GARDENS, WOOD GREEN, LONDON, N. 22.
Telegrams: "Bripurimat, Wood, London."
'Phone: Palmer's Green 608.

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SPECIALLY prepared for the manu- facture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD., with which is amalgamated WM. PEARCE & SONS, LTD.
Mark Lane, LONDON, E.C. Works—SILVERTOWN.
Telegrams—"HYDROCHLORIC, FEN, LONDON."
Telephone—1538 AVENUE (3 lines).

SEND your inquiries for Carburetted HYDROGEN AND BLUE WATER-GAS PLANT, also TAR DEHYDRATING PLANT and other GAS-WORKS APPARATUS to—
BALE AND HARDY,
39, VICTORIA STREET, WESTMINSTER, S.W. 1.

MEWBURN, ELLIS, AND PRYOR.
CHARTERED PATENT AGENTS AND TRADE MARK AGENTS,
70, Chancery Lane, London.
Telegrams: "Patent London." 'Phone: 243 Holborn.
And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams—"SATURATORS BOLTON." Telephone 0848.

"FERROX." "FERROX." "FERROX."

A BRITISH Oxide Cheaper and Better than Bogore. 35 per cent. Water, 75 per cent. Ferric Hydrate. For Sale outright or on Loan.
OXIDE LIMITED, Brentford, MIDDLESEX.

SOUTH WALES TAR COMPANY,
MAESTEGYMMER, near CARDIFF.

TAR WANTED.—Best Prices paid either at fixed Rate or Profit-Sharing Basis.

SPENCER'S Patent Inclined HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, Nov. 27, p. 437.

J. E. C. LORD, Ship Canal Tar Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the best. Satisfaction Guaranteed.

WANTED—a Second Assistant, who would be able to Take Entire Charge of the Works and Capable of Performing all the usual Gas-Works Tests.
Applicants to state Age, whether Married or Single, and give Particulars of Experience and *copies* of recent Testimonials. Salary, £175.
Applications to be addressed to the CHAIRMAN, and received not later than Dec. 15, Warrington Corporation Gas Department, Mersey Street, WARRINGTON.

WANTED—Manager and Engineer for Gas-Works near London, with House Free, Manufacturing and Distributing over 20 Millions per Annum. Electrical Experience an advantage, but not essential.
Apply, by letter, stating Age, Qualifications, and previous Employment, to No. 6385, care of MR. KING, 11, Bolt Court, FLEET STREET, E.C. 4, on or before Dec. 16 next.

ENGINEER-FITTER required for Plant in Yorkshire.
Write, giving full Particulars as to Experience and Wages required, to "J.," care of C. J. WALKER'S ADVERTISING AGENCY, 24, Coleman Street, LONDON, E.C. 2.

FOREMEN (two) required, accustomed to Carbonizing Coal and Bye-Product Recovery, for Plant in Yorkshire.
Write, stating Wages, to "L.," care of C. J. WALKER'S ADVERTISING AGENCY, 24, Coleman Street, LONDON, E.C. 2.

PRODUCER Foreman Wanted, accus- to Monds. Twelve hours' Shift. Plant in Yorkshire.
Write, with full Particulars as to Wages required, &c., to "C." care of C. J. WALKER'S ADVERTISING AGENCY, 24, Coleman Street, LONDON, E.C. 2.

WORKS Manager and Engineer, also ASSISTANT, required, Experienced in Carbonizing Coal, Recovery of Bye-Products, especially the Semi-Direct Method for Ammonium Sulphate.
Write, with full Particulars as to Salary required, &c., "P.," care of C. J. WALKER'S ADVERTISING AGENCY, 24, Coleman Street, LONDON, E.C. 2.

WANTED—two Reliable Men above Military Age (or Ineligible for Military Service) as GAS STOKERS. Must be good Shovel Chargers and understand Regenerator Furnaces, Engine, and Exhauster.
Apply, stating Age, Experience, and Wages required, to Mr. W. MILLAR, Nixon's Navigation Offices, MOUNTAIN ASH.

TWO Carbonizing Foremen required for London Suburb. Must be Good Carbonizers. None but First-Class Men need apply. Wages, £3 per Week, *plus* 15s. War Bonus.
Apply, by letter, to No. 6384, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WANTED, in the London district, a Second-Hand Rotary or Centrifugal WASHER SCRUBBER, to pass about 1 to 1½ Million c.ft. per diem.
Particulars, with Price, to No. 6383, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

JUNIOR Draughtsman Wanted as soon as possible, in connection with considerable Extensions of Works. Preference given to one with knowledge of Constructional Steel Work and Gas-Works Plant.
Apply, by letter, enclosing *Copies* of recent Testimonials, stating Age, Experience, and Salary required, to the ENGINEER, Hendon Gas-Works, SUNDERLAND.

WANTED—for the Wishaw Cor- poration Gas-Works—a Competent FITTER, one with knowledge of electrically driven plant preferred. Average hours per week, 65. Wages, 60s. weekly. Permanent Job.
Apply, stating Age and Experience, to the MANAGER, Gas-Works, WISHAW.

GAS PLANT for Sale.—We can always offer New and Second-Hand Gas Apparatus, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
FIRTH BLAKELEY, SONS, AND CO., LTD., CHURCH FENTON, near LEEDS.

THE Southampton Gas Light and Coke Company have the following RETORT-HOUSE FITTINGS for DISPOSAL:
56-16 in. Diameter Circular Tangye MOUTHPIECES, Holman's Cross Bars and Self-Seating Lids.
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78 ft. 6 in. by 2 ft. 6 in. wide by 18 in. deep Flat ∪ HYDRAULIC MAIN.
One 10 in. New RETORT-HOUSE GOVERNOR, with Inlet, Outlet, and Bye-Pass Valves.
Offers to F. DURKIN, Gas-Works, SOUTHAMPTON.

WALTHAMSTOW URBAN DISTRICT COUNCIL.
GAS-MANTLES.

THE Council invite Tenders for the Supply and Delivery of 50 Gross of Upright GAS-MANTLES for Burners consuming not more than 2 ft. per hour (Maximum Gas Pressure, 4 in.); 25 Gross of this quantity to be supplied at once and 25 Gross within Three Months.
Further information can be obtained of the Lighting Superintendent, Exeter Road Depôt, Walthamstow; and Tenderers are asked to forward Samples to Exeter Road Depôt.
Sealed Tenders, endorsed "Tender for Gas-Mantles," to be Delivered by Post to the undersigned not later than 5 o'clock p.m. on Monday, Dec. 10, 1917.
The Council do not bind themselves to accept the lowest or any Tender.
C. SYDNEY WATSON,
Clerk to the Council.
Town Hall, Walthamstow,
Nov. 27, 1917.

YELLOW Prussiate of Soda wanted, for Delivery over 1918.
Offers, free on Rails Works, to No. 6382, care of Mr. KING, 11, Bolt Court FLEET STREET, E.C. 4.

BOROUGH OF MORLEY.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the Purchase of the TAR produced at their Works during the Year ending Dec. 31, 1918.
Further Information may be obtained from Mr. H. J. Hemingway, Gas-Works, Morley.
Endorsed Tenders to be sent to the undersigned not later than Wednesday, Dec. 12.
FRED THACKERAY,
Town Clerk.
Town Hall, Morley,
Nov. 27, 1917.

SHOTLEY BRIDGE AND CONSETT DISTRICT GAS COMPANY.
TENDERS FOR TAR.

THE Directors of this Company invite TENDERS for the Purchase of the TAR produced at their Works from the 1st of January to the 31st of December, 1918. Quantity, about 80,000 Gallons. Contractor to find his own Casks, and to accept Delivery at Blackhill Station.
Tenders to be sent to the undersigned not later than Wednesday, Dec. 12, 1917.
M. RICHLEY,
Secretary.
Offices, Front Street,
Shotley Bridge.

ALDERSHOT GAS, WATER, AND DISTRICT LIGHTING COMPANY.

TENDERS are invited for the Purchase and Removal of the Company's surplus TAR over 1918.
Copy of Specification may be had on Application to the undersigned, and Tenders are due not later than 9 a.m., Dec. 11.
W. FISH,
Secretary.
Chief Office, Victoria Road,
Aldershot.

THE GAS LIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of this Company, so far as they Relate to DEBENTURE STOCK and BONDS, WILL BE CLOSED at Four o'clock p.m., on Monday, the 10th prox., for the Half Year ending on the 31st prox., and will be RE-OPENED on the morning of Tuesday, the 11th prox.
The Interest for the Half Year will be payable, on the 1st of January next, to the Proprietors registered on the closing of the Books.
By order,
WILLIAM BECKFORD LONG,
Secretary.
Chief Office: Horseferry Road,
Westminster, S.W., Nov. 26, 1917.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at THE MART, TOKENHOUSE YARD, E.C.
Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to Messrs. A. & W. RICHARDS, at 37, WALBROOK, E.C.

TROTTER, HAINES, & CORBETT, LIMITED.
BRETTEL'S ESTATE,
FIRE-CLAY & BRICK WORKS,
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Manufacturers of GAS RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every Description of FIRE BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.
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